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THE PROBLEMS OF HIATUS HERNIA: SYMPTOMS AND MEDICAL TREATMENT.[1]

By W. E. KING,
Melbourne.

HIATUS HERNIA can lay claim to being regarded as a modern condition, and at first glance appears to be steadily increasing in incidence. In fact it belongs mainly to the post-war era. Yet this cannot be so; the increasing incidence must really be due to improved methods of diagnosis. I looked up my standard text-books of medicine and surgery from twenty-one years ago when I was a student. In "Rose and Carless' Manual of Surgery" there is no mention of the condition, but Price does devote a few lines to it. I was feeling this to be evidence of the superiority of physicians when I read the prescribed treatment—one line: "The treatment is surgical." The credit for our knowledge at present must go to Allison and Harrington and their radiological colleagues, including Soresi, who described the head-down position in 1919. One other factor to be considered is the increased use of œsophagoscopy in the past ten years.

[1] Part of a symposium on "The Problem of Hiatus Hernia", held by the Victorian Branch of the British Medical Association on February 1, 1956.

The part of the physician is to suspect the diagnosis and then have it confirmed by the radiologist; sometimes an endoscopist may be necessary (unless one performs one's own œsophagoscopic examinations). Having confirmed the presence of the condition, the physician must ask himself the following questions: (i) "Is this hernia really causing all the symptoms?" (ii) "Can I treat it by medical means?" (iii) "Which patients should I advise to have an operative repair?"

The First Question.

If we are to answer the first question properly, we must consider the modes of presentation of hiatus hernia, and the symptoms it causes. It is well to remember two things at this juncture. First, a significant number of these hernias are discovered at X-ray examination, but produce absolutely no symptoms, and therefore definite clinical evidence is required before the final diagnosis is made. (An exception here is when the patient presents with anæmia, though care must be taken not to miss malignant disease of the lower alimentary tract.) Secondly, the greatest incidence of hiatus hernia is between the ages of fifty and eighty years—the age at which ischæmic heart disease is also most common.

The most typical symptom of hiatus hernia is pain. This pain is characteristically felt behind the sternum (usually the lower half) and nearly always radiates to the back. It may also radiate to the neck, shoulders and arms. In

the typical case this pain is made worse by stooping or bending forward, and commonly wakes the patient from sleep. Relief is obtained by sitting up in bed. One of the common variants giving rise to error is a history of pain on sweeping, scrubbing or similar exertion; but note that it is always in a position of flexion. This is where the differential diagnosis from cardiac disease is necessary. The diagnosis should be suggested by the following factors: (i) The pain occurs in certain positions and therefore is not a true effort pain, except as mentioned before. (ii) The history is usually too long to be consistent with ischæmic heart disease without frank failure. (iii) Radiation of pain to the back is unusual in heart lesions, except occasionally in posterior myocardial infarction. (iv) There may be associated features of hiatus hernia which will be discussed later. (v) The pain may be related to meals, but I have not found this very helpful. What I have found most useful is the symptom of vomiting or regurgitation of food during the course of a meal. This is a peculiar symptom, but is almost diagnostic. Without warning the patient feels some food stick at the lower part of the sternum with a sense of intense discomfort. She then vomits—the vomiting may be self-induced—but immediately after feels well enough to complete the meal without any loss of appetite, and no more dysphagia. This is presumably due to obstruction at the hiatal orifice. I know of no other disease in which a patient can vomit and then return to her meal without distress.

As I have said earlier, it is common to find hiatus hernia and coronary disease associated. Only the careful taking of a history will elucidate the cause of the symptoms and decide the course to be taken.

Heartburn is another frequent symptom, worse with change of posture. It is well seen in the last trimester of pregnancy, when the ætiology is obvious. Occasionally it may be the only symptom.

Belching is not a typical symptom, but may relieve the pain by diminishing the pressure in the hernial sac.

The other main symptom is dysphagia. This is not so common a symptom as pain. In fact, in my experience in hiatus hernia I have not found so many cases of severe œsophagitis and/or stricture as appear in the English series. The Americans tend to dismiss this aspect of the disease. It does occur and can easily be misdiagnosed as carcinoma if great care is not exercised. Because of the stricture it may not be easy to demonstrate the hernia radiologically in an elderly person. At œsophagoscopic examination the typical inflammatory appearances can be readily seen. Varying grades of dysphagia occur. Mention has been made of the regurgitation during meals and also of the almost complete inability to swallow. In addition, dysphagia can be intermittent and may not necessarily occur with each meal. It may be severe enough to make the patient afraid to eat, which is serious. Often there may be a history of the regurgitation of excess amounts of mucus. This often occurs at night and wakes the patient, sometimes with a fit of coughing. It is no far step to a diagnosis of left ventricular failure, particularly if care is not taken to be sure that the patient has regurgitated the mucus and not coughed it up. In other instances I have seen this mistaken for catarrh, as the patient feels the mucus collect in the naso-pharynx at night. Patients with both these types of hiatus hernia may omit dysphagia from their story unless specifically questioned.

The last mode of presentation to be considered is unexplained anæmia. At times the hernia is completely silent and yet bleeding has occurred, either from an ulcer or from some constriction at the hiatal orifice and secondary ulceration. It is well to remember that bleeding may really be occurring from an ulcer in the stomach or duodenum, or from a lesion in the large bowel. As I have pointed out earlier, it is not safe to ascribe blood loss to a silent hernia until other sites have been excluded.

We have seen how hiatus hernia may mimic other diseases; but occasionally some of the symptoms of hiatus hernia may be produced by a lesion near the pylorus (particularly carcinoma), or by a duodenal ulcer (usually with pylorospasm). Hiatus hernia is fairly often associated with gall-stones, and here again the correct treatment is possible only after a careful examination of the site and character of the pain. Remember that belching is not a symptom of gall-stones.

The Second Question.

To answer the second question: If there is much dysphagia or if a stricture is present, then medical treatment is a waste of time. Secondly, unless the patient has symptoms, medical treatment is worthless, since it is essentially symptomatic treatment.

As we are gradually moving away from a strict dietetic regime in many diseases, so here, too, does this apply. A bland ulcer diet is useful if there is peptic œsophagitis as shown by pain on eating, or even intermittent dysphagia. Otherwise I advise my patients to lose weight if they are obese, and to avoid those foods known to cause indigestion (fried foods and highly seasoned foods).

From being the sheet anchor of upper gastro-intestinal therapy, alkalis are gradually losing favour. I have found compressed milk tablets of great value if sucked between meals, and particularly on retiring.

As in ulcer therapy, sedatives and antispasmodics are often of the greatest value. Tablets containing one-quarter to one-half grain of phenobarbitone and one-half grain of belladonna are very handy and often very effective.

Anticholinergics have been rather disappointing. Theoretically they should be ideal, until one remembers that one of their side effects is to cause relaxation of the cardia. In my experience they will help only in the less common paraœsophageal or rolling type, in which the angulation of the cardio-œsophageal junction is preserved.

Mention has been made of weight reduction. The wearing of too tight corsets, which is again creeping into female fashions, is nearly as bad and should be avoided. Other causes of raised intraabdominal pressure have to be treated on their merits. The patient must be advised to sleep propped on three or four pillows.

The Third Question.

My third question was, "When should operation be advised?" The answer is in the following three conditions: (i) If bleeding continues. (ii) In the presence of severe dysphagia with or without stricture. Stricture, of course, requires operation. (iii) If pain is severe and is not responding to symptomatic treatment, and is interfering with the patient's life. Due regard must be paid to the patient as a whole, particularly to the state of the heart.

THE PROBLEM OF HIATUS HERNIA: THE PLACE OF RADIOLOGY.[1]

By A. E. PIPER,
Melbourne.

IN recent years there has been a spate of articles in the radiological literature on the subject of hiatus hernia as the result of the combined clinical, endoscopic and radiological approach. By this means our knowledge of the condition has increased greatly. However, many of the articles deal with controversial radiological problems of limited interest, and it is not proposed to discuss them this evening.

The Types of Hiatus Hernia.

Para-Œsophageal or Indirect Hernia.

According to Allison and Barrett, the para-œsophageal or indirect hernia results from a preformed sac lined by peritoneum which passes through the diaphragm anterior

[1] Part of a symposium on "The Problem of Hiatus Hernia", held by the Victorian Branch of the British Medical Association on February 1, 1956.

to the œsophageal hiatus in the right crus.[1] It is to be noted that the cardia lies below the diaphragm and reflux is not present. Not uncommonly there is weakening of the tissues between the neck of the sac and the œsophagus, leading to a mixed direct and indirect hernia.

Para-œsophageal hernia is often asymptomatic, but patients may suffer the following types of symptoms: (i) symptoms from direct pressure on the heart; (ii) symptoms from pressure on the œsophagus—dysphagia; (iii) hæmatemesis as the result of a peptic ulcer within the herniated stomach—a very difficult radiological problem because of the distortion of the ulcer-bearing area.

The Direct or Sliding Hernia.

In the direct or sliding type of hernia there is a direct herniation of the cardia through the œsophageal hiatus, with loss of function of the valve mechanism at the cardia leading to reflux of the gastric contents into the œsophagus. In contrast to the previous type, these hernias are seldom irreducible, are often small, and may appear and be reduced with great rapidity.

Radiological Examination.

Because of the difficulty in the radiological demonstration of hiatus hernia, it is essential to carry out a definite technique of radiological examination of all patients aged over forty years, and of younger subjects when there is a clinical suspicion of hiatus hernia. The fundamental aim in these manœuvres is to raise the intraabdominal pressure without raising the intrathoracic pressure so as to ensure favourable conditions for herniation of the cardia or for reflux. There are many variations, but the technique that I favour is the following: (i) The use of the erect lateral toe-touching position, with pulling on the soles of the feet, if possible, and coughing. It is essential that the stomach be full but the œsophagus empty, in order to determine whether reflux is present. Many of these patients are obese and touching their toes is only a memory. Their best attempt often still leaves their cardia well above the barium level in even a full stomach, and so reflux cannot be shown. In such instances a mouthful of barium is given, and immediately it is swallowed the patient bends down, coughs and takes a full inspiration. By this means a gastric herniation is often well outlined.

(ii) The use of the supine position. In earlier years the Trendelenburg position was strongly advised, but now even most of its earlier advocates have abandoned it. In my experience it was a most unrewarding position, and there are sound theoretical reasons why this should be so. Whilst he is in the supine position, the patient is asked to raise both legs, held out straight, off the table, and then to cough and to swallow. He is then asked to lie half on his right side and relax for a few moments; under these conditions herniation and particularly reflux sometimes appears when more active measures have failed.

(iii) The use of the prone position. Herniation is often well shown; of course, reflux in this position is a rarity. The patient is asked to turn around three times whilst lying on the X-ray table. This is a most successful measure for producing herniation, and can also be used in cases of old spinal injury in which toe-touching or straight leg-raising is impossible.

In cases of sliding hernia it is surprising how often a pronounced herniation may be shown in one position when in all others the findings are negative. It is perhaps even more exasperating to find, when these patients are reviewed three hours later on the same day, that it is possible easily to show a pronounced herniation when the result of the earlier examination was entirely negative. These cases arouse doubts in one's mind as to how long to persist, and how many attempts to make, in the demonstration of these hernias.

Perhaps these difficulties in demonstration are associated with varying bodily fatigue, for there is some evidence to show that herniation is more likely when the patient is fatigued. This has prompted some surgical writers to suggest that such examinations should be carried out at night; but I am pleased to say that I have never seen any radiologist supporting this viewpoint.

[1] Dr. Piper throughout his paper showed a number of slides illustrating various radiological points in connexion with hiatus hernia.

Problems Related to the Region of the Cardia.

The problems associated with interpretation in the region of the cardia are twofold: (i) the pouch without reflux—the so-called phrenic ampulla; (ii) reflux without a demonstrable pouch.

There is commonly seen a small pouch at the lower end of the œsophagus, the phrenic ampulla. The classical ampulla is described as concentric to the lower part of the œsophagus, has two lateral notches and has an œsophageal mucosal relief pattern. The difficulty is that the lateral notches may be simulated by the cardia of the small sliding hernia, and a small herniation may be concentric to the œsophagus.

With regard to gastric mucosal relief, Allison and Johnstone have shown, by placing metallic clips at the junction of the squamous and gastric epithelium and then radiologically examining their patients again, that it is impossible to define this junction accurately by radiological means. The tendency seems to be for the radiologist to place the gastro-œsophageal junction lower than the true junction.

It seems, therefore, that if in the absence of reflux one finds a small pouch immediately above the hiatus which appears to have mucosal folds thicker than the normal œsophageal relief, then there is justification for considering it a potential hernia and worthy of further investigation.

There is another group in which free reflux can be shown without any demonstrable pouch. Barrett points out that in these cases there is a high insertion of the cardia on the stomach, and the patients I have examined support this view. They are subject to reflux œsophagitis and the complications therefrom.

The complications of sliding hernia are reflux œsophagitis and stricture formation. Œsophagitis cannot be radiologically diagnosed with any certainty. Strictures may be of several types, and as they present problems in surgical treatment they will be discussed by Dr. Morris.

Congenital Short Œsophagus.

I want to say a few words about congenital short œsophagus, first because it is a term that has been used loosely by radiologists in association with hiatus hernia, and secondly because a true congenital short œsophagus can produce symptoms similar to those produced by a sliding hernia.

The term "congenital short œsophagus" implies that the junction of œsophageal squamous and gastric columnar epithelium has never been lying below the level of the diaphragm. Now the gullet, which traverses the mediastinum from the pharynx to the abdomen, may be lined by columnar gastric epithelium to greater or lesser degree. This may occur in several ways.

In the first type, gastric epithelium is present in the lower part of the gullet without a demonstrable hiatus hernia. This type of œsophagus appears radiologically normal, and so it cannot be diagnosed radiologically.

The second type is that described by Allison and Johnstone. In it there are above the diaphragm (*a*) a sliding hernia, (*b*) an area of œsophagus lined by gastric epithelium, (*c*) a stricture at the junction of the squamous and columnar epithelium. They consider that the squamous epithelium in the lower part of the œsophagus is destroyed by the reflux œsophagitis, and that epithelial repair occurring in the acid medium, due to gastric reflux, is by gastric columnar epithelium. This type may be diagnosed radiologically; but if we accept these views, then it is not a congenital short œsophagus, because at some stage the junction of squamous and columnar epithelium was below the diaphragm.

Finally, in association with a hiatus hernia the œsophagus which appears "short" in the physical sense at X-ray examination is usually found to be of normal length at

operation. For these reasons a radiological diagnosis of congenital short œsophagus appears untenable—it can be diagnosed correctly only by the anatomy revealed at operation.

Conclusion.

In conclusion, the duty of the radiologist in these cases has been well summarized by Johnstone, as follows:

> It is essential to recognise that the morbidity of hiatus hernia is brought about by a physiological rather than an anatomical defect. The vital radiological observation thus rests upon the presence or absence of reflux; because, if it is present, even though there is no convincing demonstration of a hernia, then there exists a 75 per cent chance of œsophagitis.

One must concur with this statement, although I think most clinicians and radiologists would challenge the figure of 75% of œsophagitis under Australian conditions—it seems to be much lower here.

With regard to the scope of radiology in this field, I think that it can be fairly said that at the present time radiology demonstrates the type and size of the hernia together with the presence or absence of physiological disturbance at the cardia in the great majority of cases. The factors responsible for sphincteric control at the cardia remain uncertain. Until the causation both of reflux and of herniation is known, then the measures adopted for their radiological demonstration must remain empirical with an inevitable percentage of error—a percentage which we believe is small with adequate examination.

THE PROBLEM OF HIATUS HERNIA: SURGICAL ASPECTS.[1]

By K. N. MORRIS,
Melbourne.

THE title of this symposium, "The Problem of Hiatus Hernia", is well chosen because the subject fairly bristles with problems. For instance, why does hiatus hernia develop? Why is it predominantly a condition of elderly women? What is the exact mechanism that governs the function of the gastric cardia? Why has one patient with a large hernia no symptoms, whilst another with a small hernia suffers greatly? Why are most of these patients grossly overweight, despite pronounced dyspepsia and dysphagia?

Fortunately I have not been called upon to answer these questions, and can confine my comments to the problems associated with the surgical management of the condition—and, in truth, there are more than enough problems here.

If I was discussing the indications for operation upon inguinal hernia, I would say that the presence of the hernia constituted the indication for operation, and that only advanced age, debility *et cetera* would modify this attitude. With hiatus hernia the problem is not so simple, because the patients fall into three separate categories. First, there is a group of patients in whom the radiologist can demonstrate the presence of an hiatus hernia, but who have no symptoms referable to this lesion. Such patients do not need operation or any other treatment directed towards the hernia. Secondly, there are patients who have complications, or severe symptoms which are not alleviated by medical treatment. These patients require operation. In the third group the problem is more difficult, because these are the patients in whom the symptoms of hiatus hernia can be partially or completely relieved by medical measures. There is considerable room for debate here, and undoubtedly one's views will be coloured by personal experience.

It must be remembered that medical treatment cannot abolish hiatus hernia. All that can be done is to palliate the œsophagitis, relieve pain and counteract the effects of acute or chronic blood loss. If the treatment is relaxed, the symptoms will return. The patient must be prepared to face a lifetime of medication with dietary, postural and even ocupational restrictions. Many people will find this preferable to operation. In the old, enfeebled patient there is no doubt that this is correct, but in the younger and fitter subject this is not necessarily so.

Each case must be considered individually. Many of the patients upon whom we have operated are people who have become "fed up" with treatment, and who have demanded that something be done "to put an end to all this business".

In the group of patients who have regurgitant œsophagitis it must be remembered that, unless the condition is completely relieved, the patient may slowly develop a stricture of the lower end of the œsophagus. Such strictures are very difficult to treat.

When considering operation, one must be satisfied that the symptoms are, in fact, due to the hernia that has been demonstrated. The great majority of patients have symptoms that are quite characteristic of hiatus hernia, and a proper assessment of these symptoms, in conjunction with a proper investigation of the patient, should put the diagnosis beyond doubt. There is a smaller group of patients in whom a hiatus hernia has been demonstrated, but whose symptoms are atypical. I am very reluctant to operate upon these people, and usually do so only when a physician persuades me to eliminate hiatus hernia from the diagnostic possibilities. It is in this group that one finds the unsatisfactory results.

It is this type of diagnostic dilemma which prompts people to suggest that the repair of hiatus hernia should be effected via the abdomen, in order that the opportunity may be taken to explore the abdominal viscera. In the majority of patients the diagnosis is beyond doubt and such exploration is not necessary. In the few cases in which exploration may be desirable, it can be carried out very adequately during the course of the transthoracic, transdiaphragmatic operation.

Occasionally one encounters a patient in whom it is possible to demonstrate both gall-stones and an hiatus hernia. If the symptoms are characteristic of gall-bladder disease and do not appear to be referable to the hiatus hernia, then the gall-stones should be treated upon their own merits and the hernia ignored. If some of the symptoms appear to be characteristic of hiatus hernia, then both conditions must be dealt with. The best way to do this is through an upper mid-line abdominal incision, which allows both cholecystectomy and repair of the hernia to be effected. In the series of cases described later on, several patients were handled in this manner, but on each occasion it was recognized that the repair of the hernia was much more difficult and less efficient than was the case with the transthoracic procedure.

Anatomical Considerations.

An hiatus hernia consists of a protrusion of stomach into the lower mediastinum, through a relaxed œsophageal hiatus of the diaphragm.

The œsophagus passes from the thorax into the abdomen through an opening in the diaphragm formed by a decussation of portion of the right crus. The lower end of the œsophagus is anchored by a sheet of fascia passing from the œsophagus to the surrounding diaphragm. As long as this œsophagophrenic ligament is intact, the œsophagus is held under longitudinal tension like a stretched piece of elastic. If the œsophagophrenic ligament is weakened and stretched, the œsophagus will contract longitudinally to pull the stomach through the relaxed hiatus into the mediastinum. This is the more common form of hiatus hernia. It is a sliding hernia, and thus does not possess a complete or true sac.

If the œsophagophrenic ligament remains intact whilst the hiatus becomes relaxed, a true peritoneal hernial sac can be forced up into the mediastinum. Because the stomach is anchored securely at both its cardiac and pyloric ends, it can pass into the sac only by rolling upwards on an axis passing from the pylorus to the cardia. The greater curvature passes up to lie above the

[1] Part of a symposium on "The Problem of Hiatus Hernia", held by the Victorian Branch of the British Medical Association on February 1, 1956.

lesser curvature. The extreme form of this is sometimes called the "upside down stomach".

In the sliding form of hiatus hernia, the peritoneal sac lies in front of the œsophagus. In the paraœsophageal form, the true hernial sac most commonly is in front of the œsophagus; but occasionally it can be behind the œsophagus, when it will be a diverticulum of the lesser sac.

Various combinations of these types of hernia can occur and be a source of confusion at operation.

In order to repair an hiatus hernia, the stomach must be returned to the abdomen, the sac excised and the edges of the œsophageal hiatus approximated snugly about the œsophagus. The operation which we employ was devised by Allison and is described clearly in his classical publication on the subject.

This transthoracic operation gives the maximum access to the operative field, from both above and below. Even the most unusual forms of combined hernia can be appreciated in all their complexities and an accurate reduction and repair performed.

I shall now discuss several special problems associated with hiatus hernia.

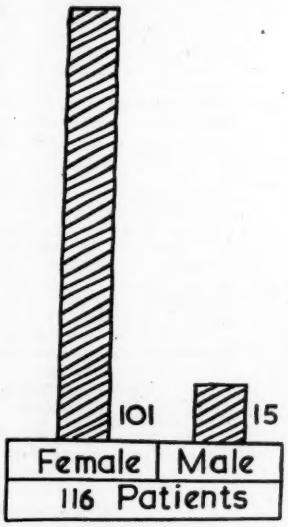

FIGURE I.

Sex distribution of 116 of the patients submitted to operation for hiatus hernia.

Short Œsophagus.

It is possible that there is such a condition as true congenital short œsophagus, but it must be extremely rare. Reports on X-ray barium meal examinations often state that a patient has a "short œsophagus", and by œsophagoscopy it can be demonstrated that the distance between the teeth and the cardia is less than normal. Neither of these investigations necessarily proves that the œsophagus is truly short. The œsophagus is an elastic organ which normally is under longitudinal tension. Should the lower end become mobile, as in cases of hiatus hernia, the œsophagus tends to contract in length. It may now be said to be a short œsophagus, but it is capable of resuming its normal length when the hernia is reduced. The so-called short œsophagus is thus not a contraindication to operation.

In the presence of severe œsophagitis the problem is different, because long-standing inflammation in a relaxed œsophagus may result in true shortening by fibrosis.

Hiatus Hernia in Infancy.

Although hiatus hernia occurs usually in elderly women, there is a very clear-cut small group of cases occurring in infants. The hernia is of the sliding type. It has no relation to the other forms of congenital diaphragmatic hernia, which are due to the presence of various abnormal openings in the diaphragm.

The condition usually appears as a feeding problem soon after birth, with dysphagia, vomiting *et cetera*. These patients have a pronounced degree of œsophagitis, and the condition progresses to stricture formation with amazing rapidity. It is usual for the initial diagnosis to be missed, and when the stricture is demonstrated at some later date, the diagnosis of congenital stricture of the œsophagus is made. Because the fibrosis has occurred whilst the œsophagus was in a relaxed position, there is a true shortening of the œsophagus, and sometimes the condition is called congenital short œsophagus. The use of the word "congenital" is incorrect in both of these instances, because both the stricture formation and the shortening of the œsophagus are secondary to the œsophagitis, which is due to the hiatus hernia. Early diagnosis and operation are important in these young people.

Hiatus Hernia with Stricture of the Œsophagus.

In the sliding type of hiatus hernia, stricture of the lower end of the œsophagus may occur as the result of severe and long-standing œsophagitis. This is an extremely difficult problem to treat. No permanent benefit will result from any treatment which is directed towards the stricture and which ignores the hernia. If the stricture can be dilated, it can usually be persuaded to stay patent if the hernia is repaired and the œsophagitis abolished.

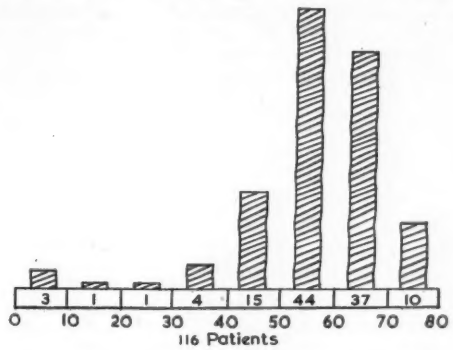

FIGURE II.

Age distribution of 116 of the patients. The bottom figures indicate years. The top figures indicate the number of patients in each decade.

If the stricture is extensive and undilatable, then it must be excised. If the œsophagus was to be anastomosed to the stomach, more œsophagitis and more stricture formation would result, so it is necessary to carry out an œsophago-jejunal anastomosis.

Hiatus Hernia with Gastric Ulcer.

Occasionally it may be possible to demonstrate the presence of a peptic ulcer in that part of the stomach which is herniated into the chest. Such ulcers cannot be persuaded to heal whilst the hernia is present. If the hernia is repaired, they usually heal very readily.

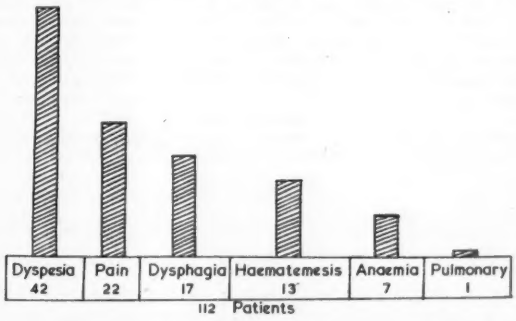

FIGURE III.

The main presenting symptom in 112 patients.

Analysis of Results.

In the Thoracic Surgical Unit of the Alfred Hospital 120 operations for the repair of hiatus hernia have been carried out by Dr. C. J. Officer Brown or myself. An analysis is shown in Figures I, II and III. It will be noted that there are approximately seven females to one male, and that the majority of the patients are aged over fifty years. The most common presenting symptoms were dyspepsia and pain.

Results.

Between 1941 and 1948, 10 operations were carried out, the abdominal route as advocated by Harrington being used. The recurrence rate in this group was 50%.

Between 1948 and 1951, 15 patients were treated, by the performance of a purely thoracic operation designed by Sweet. This differs from the operation that I have just described, in that the diaphragm is not opened to permit access to the hiatus from both above and below, and the sac is not excised. The recurrence rate in this group again came close to 50%.

These results can be regarded only as unsatisfactory.

Since 1951 we have on 90 occasions used Allison's operation. As far as I have been able to trace these 90 patients, there have been only four recurrences among them, and all those recurrences were among the first 30 operations. As far as I can discover, there have been no recurrences from the last 60 operations.

I appreciate the fact that there may be some recurrences in untraced patients. Most of these patients have kept in close contact with our follow-up department and declare themselves well and free of symptoms. The only four patients who exhibited a return of symptoms were shown, by barium meal X-ray examination, to have had a recurrence of their hernia.

Even though my figure of four recurrences in 90 operations, with none in the last 60, is perhaps too optimistic, it cannot be far wrong, and it serves to indicate the order of the recurrence rate, if not the actual figure.

I should like to point out that about 90 of these patients were aged over fifty years, and about 50 of them were aged over sixty years. Despite this fact, only one of these patients failed to leave hospital fit and well. This one death was that of a woman, aged sixty-three years, who died three days after operation as the result of a cerebral vascular accident. Most of these patients were out of bed on the second post-operative day, and left hospital on the twelfth day.

These facts show that the operation produces very little disturbance in the patients, despite the advanced age of the majority of them.

Conclusion.

In conclusion, I wish to say that I feel that the surgery of hiatus hernia has now advanced to a very satisfactory stage. The mortality and morbidity are extremely low, and the recurrence rate is small and will become smaller with increasing experience.

Many of these patients have been miserable for years with chronic dyspepsia, dysphagia or pain. Others have had their lives endangered by massive hæmorrhage, chronic anæmia or œsophageal obstruction. These people are usually given a relief that is so complete and dramatic that many of them are among our most grateful patients.

Reference.

ALLISON, P. R. (1951), "Reflux Œsophagitis, Sliding Hiatal Hernia, and the Anatomy of Repair", *Surg., Gynec. & Obst.*, 92 : 419.

STERNAL PUNCTURE: ITS INDICATIONS AND LIMITATIONS.

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STERNAL PUNCTURE is now a common procedure. It is a routine test in many hæmatological investigations and is often requested in cases of lymphadenopathy, enlargement of the liver or spleen, destructive disease of bone or, indeed, in any obscure protracted illness. It is often used without full knowledge either of its possibilities or of its limitations, and although important information may be obtained the results are frequently disappointing. In this paper we have attempted to assess the exact part played by sternal puncture in the diagnosis and management of an unselected series of patients. We have also tried to decide in each case whether the marrow was able to amplify information obtained from the peripheral blood. Finally, on the basis of this experience we have attempted to define the exact position that his test should hold.

THE PRESENT INVESTIGATION.

During the years from 1945 to 1952 at Sydney Hospital samples of marrow were aspirated from 272 patients. This period was selected as giving adequate time for follow-up study, which was often necessary. The complete records and the progress of all these patients were studied, firm diagnoses were established, and the series was subgrouped according to the different diseases as shown in the following tabulation of the 272 patients studied.

A. The Anæmias and Related Disorders. 102 cases.
   - Pernicious anæmia, 12.
   - Pernicous anæmia (probable but unproved), 23.
   - Intestinal macrocytic anæmia, 6.
   - Hæmolytic anæmia, 13.
   - Iron deficiency anæmia, 12.
   - Agranulocytosis, 7.
   - Aplastic anæmia, 13.
   - Thrombocytopenia, 7.
   - *Polycythæmia vera*, 8.
   - Erythroid myelosis, 1.

B. The Leuchæmias and Reticuloses. 85 cases.
   - Acute leuchæmia, 16.
   - Monocytic leuchæmia, 2.
   - Chronic myelocytic leuchæmia, 7.
   - Myelosclerosis, 9.
   - Chronic lymphocytic leuchæmia, 11.
   - Myelomatosis and solitary myeloma, 24.
   - Lymphoid reticuloses, 16.

C. Miscellaneous Conditions. 85 cases.
   - Malignant disease, 19.
   - Hepatic cirrhosis, 17.
   - Chronic renal disease, 7.
   - Miscellaneous innocent bony disease, 6.
   - Abdominal tuberculosis, 2.
   - Acute pyogenic infection, 2.
   - Innocent lymphadenopathy, 6.
   - Gaucher's disease, 1.
   - Malnutrition, 1.
   - Leprosy, 1.
   - Malaria, 1.
   - Lipomelanic reticulum cell hyperplasia, 1.
   - Chronic idiopathic neutropenia, 1.
   - Splenomegaly of unknown ætiology, 3.
   - ? Myelomatosis, ? metastatic carcinoma, 1.
   - Discarded cases, 16.

The diagnoses were made by clinical means—that is, by consideration of the history, physical signs, laboratory investigations and progress. Reports on the pathology of excised glands were available for many patients with lymphadenopathy. Autopsy was performed on 71 subjects. Inevitably, as many of these people are still living, the reaching of a diagnosis has involved personal interpretation of clinical findings and is therefore subject to error. However, all possible information was collected about each patient, and when necessary the patient's own practitioner or the patients themselves were consulted for additional information. Doubtful cases were discarded from the series. In each instance the myelogram and the peripheral blood examination, made close to the time of the marrow puncture, were studied together. The diagnostic value of marrow aspiration and the additional information which study of the marrow could supply in any group over that obtained from the blood alone could thus be assessed. The main abnormalities which occurred in the peripheral blood and in the bone marrow in the different diseases have been mentioned in the following sections. Detailed morphological descriptions have not been given, as they are outside the scope of this investigation.

TECHNIQUE.

Technique must be mentioned briefly because it undoubtedly bears some relationship to the information gained. In almost all instances blood was taken from the sternum at the level of the second intercostal space. The technique of puncture was one in common use (Wintrobe, 1951). Approximately one cubic centimetre of marrow

fluid was aspirated and expelled directly onto slides, and thin films were spread. These were stained by the Jenner-Giemsa method and 500 cells were classified and counted. Other stains, such as peroxidase and Ziehl-Neelsen, were sometimes used. Bacteriological and cultural examinations were occasionally performed. Marrow samples were sometimes allowed to clot and were subsequently fixed and sections were prepared to allow the general architecture and cellularity of the marrow to be studied; but when this point was seriously under consideration trephine biopsy was employed.

RESULTS.

The Anæmias and Related Conditions.

Pernicious Anæmia.

In four out of 12 patients, on examination of the peripheral blood there was found severe macrocytic anæmia, anisocytosis, slight leucopenia, a shift to the right in neutrophile cell maturation, and scanty platelets. These findings were considered typical of pernicious anæmia. The other nine patients had lesser degrees of the same abnormalities. The bone marrow was studied primarily to decide whether erythrogenesis was megaloblastic or normoblastic. Other abnormalities noted were increased cellularity, lowering of the myeloid-erythroid ratio, the presence of giant metamyelocytes and macropolycytes, and abnormal formations amongst the more mature nucleated red blood cells. Erythropoiesis was unquestionably megaloblastic in every case. Megaloblastic cells accounted for 10% to 54% of the marrow count.

Pernicious Anæmia, Probable but Unproved.

During the same period the marrow examination was carried out on 23 other patients, all of whom probably had pernicious anæmia. The diagnosis was never completely established, however, usually through failure to demonstrate histamine-fast achlorhydria or through the premature commencement of treatment. In 17 cases examination of the bone marrow revealed frank megaloblastic maturation. The other six patients were found to have normoblastic erythrogenesis, and each had received injections of liver extract prior to sternal puncture.

Intestinal Macrocytic Anæmia.

Six cases occurred in which there was moderate macrocytic anæmia, together with excess fat in the fæces. Investigation of the intestinal defect was not ideally complete in any case. The marrow was of a mixed normoblastic-megaloblastic maturation appearance in four cases and was virtually normal in the other two.

Hæmolytic Anæmia.

There were six patients with congenital spherocytic hæmolytic anæmia, six with acquired hæmolytic anæmia, and one with Cooley's anæmia (*thalassæmia major*). The diagnosis was made in each case by blood counts and serological and biochemical tests. The myelogram did not assist the actual diagnosis in any case. However, a constant abnormal cellular pattern was found, the degree of which was roughly proportionate to the severity of the hæmolytic process. Marrow cellularity was increased due to hyperactive erythrogenesis, erythroid cells numbered up to 70% of the total marrow cells, and the myeloid-erythroid ratio was low and often reversed. There was a pronounced shift to the left in the red cell series. The bone marrow findings were considered to be suggestive of hæmolytic anæmia in 11 of the 13 patients.

Iron-Deficiency Anæmia.

The diagnosis of iron-deficiency anæmia in our 12 cases was made from the blood count, the history and the physical findings. The most constant abnormalities in the bone marrow were an increase in total cellularity, an increase in erythrogenesis with a shift to the left, and a low myeloid-erythroid ratio, which was at the lower limit of or below normal in nine instances. In addition the morphology of the normoblasts was typical of iron deficiency (Bodley-Scott, 1939) in half the cases. Most of the marrow specimens were devoid of pigment granules. Special stains for iron were not used as a routine measure, although recent papers (Hutchinson, 1953) suggest that they may be of value. The myelogram was not essential in any instance, but was sufficiently typical to suggest iron deficiency in eight out of the twelve patients.

Agranulocytosis.

There were seven patients with less than 1000 leucocytes and fewer than 500 neutrophile cells per cubic millimetre of blood. Anæmia and thrombocytopenia were variable, but usually severe. The cellularity of the marrow was normal or low, erythropoiesis was essentially normal, but granulopoiesis was greatly reduced. The stage of maturation most affected varied considerably. In six of the seven specimens of marrow, cells were found which were variously identified as histiocytes, immature lymphocytes, reticulum cells, myelocytes, "blast" cells and unclassifiable cells. They usually formed more than 20% of the total marrow count. Typical reticulum cells were also increased. It seems likely that these abnormal cells are all essentially the same, and many workers have experienced difficulty in their classification (Davidson *et alii*, 1943; Rhoads and Miller, 1938). It was sometimes difficult, because of these cells, to separate this marrow appearance from that of acute leuchæmia. The longest survival in this group from the onset of symptoms was thirteen months, and an abnormal myelogram of this type gave some indication of a poor prognosis.

Aplastic Anæmia.

There were 13 patients with varying grades of aplastic anæmia and varying degrees also of leucopenia and thrombocytopenia. In contrast with the last group, leucocytes in every case numbered more than 1000 and neutrophile cells more than 500 per cubic millimetre. Seven of these patients died in from eight months to three years from the onset of symptoms, and six patients survived longer than this time. In the marrows there were no constant abnormalities of erythropoiesis. In contrast to most of the cases of agranulocytosis, granulopoiesis was often normal and never severely decreased. Unclassifiable cells of the type seen in agranulocytosis occurred in one patient who lived for eight months. Lymphocytes were increased in five instances and varied between 24% and 64%.

Thrombocytopenia.

Two patients with idiopathic thrombocytopenia conformed to the usual clinical descriptions of the disease, and the peripheral blood findings were likewise typical. The myelograms showed erythroid hyperplasia, increased numbers of megakaryocytes, and a decreased and abnormal production of platelets. Five cases of secondary thrombocytopenia occurred owing to a variety of drugs. Megakaryocytes were decreased in each one, there were more immature forms, and the formation of platelets was retarded. When bleeding was prominent, erythrogenesis was increased and shifted to the left, with a lowering of the myeloid-erythroid ratio. In all seven cases megakaryocytes, platelet formation and the platelets themselves were noted to be abnormal. Detailed morphological study of the megakaryocytes was not undertaken, although variations in size, lack of granularity and lack of fragmentation into platelets were noted in various films. From a diagnostic point of view the myelogram was of little assistance.

Polycythæmia Vera.

The blood count was quite typical in all eight cases of *polycythæmia vera*. The myelogram was normal in five cases. Cellularity was never greatly increased. Erythropoiesis was significantly increased only once when red cell precursors formed 60% of all the cells. There was a shift to the left in red cell maturation in three instances. The other marrow cells were not significantly altered. In this

TABLE I.

Disease.	Number of Cases.	Diagnosis.		Myelogram Abnormal but Not Important to Diagnosis.	Remarks.
		Made on Peripheral Blood Findings.	Myelogram Contributed Significantly.		
Pernicious anæmia	12	4	12	—	Megaloblasts more than 5% in all.
Hæmolytic anæmia	13	13	—	11	Cellularity increased. Erythrogenesis active.
Iron deficiency anæmia	12	12	—	8	Erythrogenesis increased. Normoblasts abnormal.
Agranulocytosis	7	7	—	6	Immature, atypical cells in six myelograms. Confusion with myelograms of acute leuchæmia. Useful in prognosis.
Aplastic anæmia	13	13	1	5	Immature, atypical cells in one marrow; lymphocytosis 24% to 64% in five specimens of marrow.
Thrombocytopenia	7	7	—	7	Various megakaryocyte and platelet abnormalities.
Polycythæmia vera	8	8	—	4	Increased erythropoiesis once; shift to left in three cases.
Acute leuchæmia	16	15	1	16	Myelogram easily confused with that of agranulocytosis.
Chronic myelocytic leuchæmia ..	7	4	3	7	Myelogram helpful when blood count low.
Myelosclerosis	9	9	8	—	Blood showed leuco-erythroblastic anæmia. No marrow aspirated in seven cases; fibrous material in one case.
Chronic lymphocytic leuchæmia..	11	10	1	9	Less than 70% marrow lymphocytes in two cases.
Myelomatosis	27	—	21	3	Plasma cells more than 10% with immature forms in 21 cases.
Lymphoid reticuloses	16	—	—	4	Abnormalities were lymphocytosis, eosinophilia and blast cells.
Metastatic malignant disease ..	19	—	4	—	Cells foreign to the marrow in three cases; aspiration failed in one case.
Hepatic cirrhosis	17	—	—	6	Changes of blood loss and iron deficiency.

disease the marrow added nothing to a diagnosis which could be made so definitely from the blood count and the physical signs.

Erythroid Myelosis.

A single case of erythroid myelosis occurred, in a young female, which appeared to answer the classical description of this disease (di Guglielmo, 1946). The myelogram was typical and important in establishing the diagnosis.

The Leuchæmias and Reticuloses.

Acute Leuchæmia.

There were 16 patients with acute leuchæmia, five of whom were in an aleuchæmic phase when first examined.[1] Because of the primitive nature of the cells, further differentiation of the type of leuchæmia was not attempted. The findings in the peripheral blood films were straightforward in 15 of the patients, and there was a suggestion of leuchæmia in the sixteenth. "Blast" cells were increased in the bone marrow in all patients. Sternal puncture thus provided the diagnosis in the one case which could not be diagnosed from the blood film, and it also confirmed the aleuchæmic cases. In the others the myelogram served no useful purpose, and when one was trying to distinguish between agranulocytosis and acute leuchæmia (two conditions which have many points in common) it was sometimes confusing. This is discussed further in the section on agranulocytosis.

Starvation.

An interesting point in differential diagnosis was provided by a patient admitted in the terminal stages of malnutrition. Examination of the bone marrow revealed an increase of blast cells (26%) and increased erythropoiesis, an appearance which could not certainly be distinguished from acute leuchæmia (Custer, 1949). Autopsy subsequently excluded leuchæmia.

[1] We consider leuchæmia to be aleuchæmic when the leucocytes number less than 10,000 cells per cubic millimetre.

Monocytic Leuchæmia.

Only two cases of monocytic leuchæmia occurred in this series. In both patients the blood count was typical and marrow examination was confirmatory.

Chronic Myelocytic Leuchæmia.

Of seven patients with chronic myelocytic leuchæmia, the peripheral blood count was typical in four. In these, leucocytes numbered more than 50,000 per cubic millimetre, there was a moderate to severe anæmia, and immature neutrophile cells (21% to 51%) and normoblasts (1% to 4%) were present. Admittedly, equivalent leucocytosis can occur in other diseases, such as myelosclerosis, although uncommonly (Churg and Wachstein, 1944) and acute infections (Krumbhaar, 1926). The myelogram gave reliable evidence of myeloid leuchæmia in all patients. The cellularity was invariably increased, and this was regarded as the most important change. Increased cellularity was due to hyperactive granulopoiesis, and without exception the myeloid-erythroid ratio was increased to an extent not seen in other diseases (17:1 to 120:1). In three instances sternal puncture established the correct diagnosis in the presence of the low peripheral leucocyte counts of 28,000, 17,000 and 15,000 per cubic millimetre respectively.

Myelosclerosis.

Nine patients suffering from myelosclerosis were investigated. Moderate to severe leucoerythroblastic anæmia occurred in all instances, with many immature leucocytes (up to 56%) and normoblasts (up to 15%) in the blood. Occasional megakaryocytes appeared in two cases, a finding suggestive of myelosclerosis (Wyatt and Sommers, 1950). The highest total number of leucocytes was 33,000 per cubic millimetre. The leuco-erythroblastic anæmia and splenomegaly indicated the possibility of myelosclerosis, and sternal puncture was very useful in helping to diagnose this condition. In only one instance was a normal sample obtained. In a further case fibrous marrow was aspirated, and this enabled a positive diagnosis to be made. From the other seven patients no specimen at all could

be obtained and the bone felt unusually firm to the needle; these two points indicated the need for a trephine biopsy, which was later performed.

Chronic Lymphocytic Leuchæmia.

There were 11 patients with chronic lymphocytic leuchæmia. The peripheral blood count was typical of the disease and was stated to be diagnostic in all but one instance. The marrow was required to show more than 70% of mature lymphocytes and numerous smear cells before being regarded as typical of this disease. When these criteria were used, from all but two patients diagnostic myelograms were obtained, including the patient with the doubtful blood count. These two patients had levels of 66% and 51% of lymphocytes. These figures were not considered to be diagnostic, as we have encountered cases of chronic non-leuchæmic lymphocytosis in which there were 65% of lymphocytes in the bone marrow in both lipomelanic reticulosis and aplastic anæmia.

Myelomatosis.

There were 23 patients with myelomatosis, whose marrow was examined 27 times. The blood count was abnormal in all instances. Common findings were severe leuco-erythroblastic anæmia, rouleaux formation, high erythrocyte sedimentation rates, and, in a few cases, occasional plasma cells. In many cases these deviations were sufficient to suggest the diagnosis of myelomatosis, but in no case could an unequivocal diagnosis be made. Twenty-one of the 27 specimens of marrow aspirated were found on examination to be highly suggestive of myelomatosis, in that plasma cells numbered more than 10% and immature cell forms occurred. The average number of plasma cells was 30%, the highest was 63% and the lowest was 12%. Of the other six examinations, in three instances gross immaturity of the plasma cells made differentiation from anaplastic malignant disease impossible; two specimens were normal, but a second aspiration showed excess plasma cells and in one case, almost certainly one of multiple myeloma on the sum total of evidence, the marrow was hyperplastic, but plasma cells were not increased.

Solitary Myeloma.

One patient with a solitary myeloma of the humerus (confirmed by pathological examination of the amputation specimen) was examined. Plasma cells numbered 9% and 5% on two occasions.

Lymphoid Reticuloses.

There were nine patients with Hodgkin's disease, four with follicular lymphoma and three with reticulosarcoma. No instances of lymphosarcoma occurred. The peripheral blood was found to be completely normal in only two instances, but the abnormalities which occurred were not in any way specific—usually normocytic or leuco-erythroblastic anæmia, slight to moderate leucocytosis and an increase in the erythrocyte sedimentation rate. There were no typical abnormalities. Indeed, if leuchæmia is excluded, the blood is rarely diagnostic in these disorders. The bone marrow was grossly abnormal in four instances only; in one patient 64% of the marrow cells were lymphocytes; in another the majority of cells in the scanty aspirate were also lymphocytes; in a further patient 13% of blast cells occurred; and the marrow of the fourth patient contained 60% of eosinophile cells. Minor abnormalities included slight eosinophilia (three patients), slight lymphocytosis and an increase in reticulum cells. Study of the marrow cytology thus gave little additional useful information. In relation to this series, marrow was aspirated in a further six miscellaneous cases of what proved to be innocent lymphadenopathy, without positive information being obtained.

Miscellaneous Conditions.

Malignant Disease.

Marrow examination was performed in 19 patients as part of the investigation of an abnormal blood picture or, as in seven of our patients, because of X-ray evidence of bony disease. In each patient the marrow was aspirated once only. The sternum was used in all but one patient, in whom the ilium was punctured at the site of a local lesion. The blood count was quite normal in one patient and only slightly abnormal in another seven. In 11 cases there was a significant departure from normal, the commonest findings being severe anæmia (often leuco-erythroblastic), raised erythrocyte sedimentation rate and increase in the neutrophile cells. Malignant cells, foreign to the bone marrow, were recognized in three patients who had respectively carcinoma of the breast, malignant melanoma, and anaplastic carcinoma from an unidentified primary site. In a fourth patient the sternum was difficult to penetrate and no marrow could be obtained. Examination of the subsequent trephine biopsy specimen revealed typical sclerosing prostatic cancer. In two further patients the level of mature plasma cells was raised to 7%. In this series casual examination of the bone marrow was not helpful in diagnosing malignant disease.

Hepatic Cirrhosis.

Of 17 patients with hepatic cirrhosis, hepatomegaly occurred in all and coincident splenomegaly in 12. The blood was abnormal in every case, although only slightly so in nine. In eight patients with splenomegaly there occurred anæmia, leucopenia and thrombocytopenia, and these abnormalities were interpreted as being due to hypersplenism. Macrocytic anæmia occurred in six patients. The myelogram revealed definite abnormalities in six patients, there being increased cellularity, increase in erythropoiesis, low myeloid-erythroid ratio and the ragged normoblasts of iron deficiency. Minor changes of a similar nature occurred in a further six patients. As these changes were those of chronic blood loss and iron deficiency, they were thought to be due to bleeding and nutritional defects rather than to the cirrhosis itself. No megaloblasts occurred in the bone marrow. No positive assistance was gained in the diagnosis of hepatic cirrhosis from examination of the marrow.

Chronic Renal Disease.

The bone marrow was examined in seven patients with chronic renal disease as part of the investigation of obscure anæmia. Nitrogen retention was present in two patients. The blood count was abnormal in all seven. The most frequent feature was a moderate to severe grade of normocytic anæmia. The bone marrow findings departed only slightly, if at all, from normal.

Miscellaneous Bony Abnormality.

In the group of miscellaneous bony abnormalities there occurred four cases of menopausal osteoporosis, one of Paget's disease of bone, and one of *osteitis fibrosa cystica localisata*. The blood counts were essentially normal in each case, and no aid to diagnosis was obtained from the marrow.

Tuberculosis of the Liver and Spleen.

CASE I.—A male patient, aged sixty-nine years, was found to have a high percentage of lymphocytes in the marrow at a time when the blood examination showed anæmia only. The correct diagnosis was reached only at autopsy.

CASE II.—A male patient, aged fifty-one years, with moderate macrocytic anæmia and pyrexia, both of long duration, was found to have 8% of megaloblasts in the marrow, and the general findings were considered to be consistent with a diagnosis of pernicious anæmia. Lymphocytes were present in normal numbers. Other investigations excluded pernicious anæmia. Because of some similarity to the first patient he was given streptomycin with complete success and was well twelve months later. It was inferred that the correct diagnosis was one of abdominal tuberculosis.

Acute Pyogenic Infection.

Two patients with acute pyogenic infection who had peripheral leucocyte counts of 17,000 and 23,000 per cubic millimetre were found to have only minor abnormalities in the marrow. The myeloid-erythroid ratios were within normal limits. The marrow was successfully examined to exclude a diagnosis of myelocytic leuchæmia.

Gaucher's Disease.

In the only example of Gaucher's disease there was found to be moderate normocytic anæmia. The marrow was typical, in that numerous Gaucher cells occurred.

Miscellaneous Conditions.

The bone marrow was found to be normal in a patient with leprosy, a patient with malaria, one patient with chronic idiopathic neutropenia, and three others with splenomegaly of undetermined origin. In these last-mentioned, aleuchæmic leuchæmia was excluded on the basis of the myelogram. An interesting case of lipomelanic reticulum-cell hyperplasia associated with non-leuchæmic erythrodermia also occurred. The bone marrow on several occasions contained up to 60% mature lymphocytes with many smudge cells, a picture indistinguishable from chronic lymphocytic leuchæmia.

DISCUSSION.

This investigation was undertaken to determine the indications for sternal puncture in routine hæmatology. Conclusions have been drawn by looking back over a series of unselected patients and evaluating the information that was obtained by examination of tissue obtained by sternal puncture and by the peripheral blood count in diagnosis and prognosis. It often proved difficult to make this evaluation, as rarely in hæmatology can an unequivocal diagnosis be made by a single investigation, and consequently the worth of a single test is hard to determine. With due consideration for these difficulties our findings are summarized in Table I. This table demonstrates that information of the greatest positive value was obtained from patients with untreated pernicious anæmia, multiple myeloma, the leuchæmias, and myelosclerosis. Fairly constant patterns were also obtained in hæmolytic anæmia, in anæmia due to iron deficiency and in thrombocytopenia, and information of possible prognostic importance was provided in some instances of agranulocytosis and aplastic anæmia. The contribution to the diagnosis and management of other diseases was small.

In the macrocytic anæmias sternal puncture is only one step in a pattern of investigation which must be followed if these anæmias are to be identified accurately. It is an essential test to perform, and it will determine whether erythrogenesis is proceeding along megaloblastic or normoblastic lines. If the marrow contains more than 5% of megaloblasts, erythropoiesis is proved to be megaloblastic, and the type of megaloblastic anæmia must then be decided by other means. A great deal has been written about the difficulties of identification of the megaloblast. Admittedly some trouble may be encountered when there are only a few present, and in the mixed normoblast-megaloblast pattern in some instances of non-Addisonian megaloblastic anæmia. However, in most cases it is possible without great difficulty to recognize megaloblasts in a well-stained, well-spread film.

In cases of multiple myeloma the combination of leuco-erythroblastic anæmia and a high erythrocyte sedimentation rate often indicates this disease; but proof by other investigations is always necessary. Sternal puncture is the most important single test. In most instances the marrow is diffusely abnormal, as plasma cells are increased and immature in casual samples, even when the bones are normal to X-ray examination or show only localized involvement. In only two instances did a second puncture reveal abnormal plasma cells not demonstrated in the first puncture, and although this is an uncommon happening it emphasizes the value of a second marrow examination in a doubtful case. It is uncommon in any other condition to encounter either plasma cell values higher than 10% or immature plasma cells. The only diseases in this series to give comparable figures were two cases of metastatic malignant disease (7% and 7%) and two cases of aplastic anæmia (7% and 17%), and in all these patients the plasma cells were mature. The only real problem in our series was in differentiating immature plasma cells from anaplastic malignant cells, a separation which was occasionally impossible on purely morphological grounds.

In the leuchæmias, both acute and chronic, further information was obtained from the marrow in only occasional cases, although an abnormal and typical pattern usually occurred. In some instances it was impossible to distinguish between acute leuchæmia and agranulocytosis by the marrow picture alone. Immature, often unidentifiable cells frequently occurred in agranulocytosis, and were difficult to differentiate from the blast cells of leuchæmia. Confusion betwen the myelograms of these two diseases was common. In general the peripheral blood findings were more distinctive, as both the total leucocyte count and the neutrophile cell count were much higher in leuchæmia, even in the aleuchæmic cases, and the degree of cellular immaturity was much greater. Despite this, an occasional case can be finally diagnosed only at autopsy. Sternal puncture proved its importance in the diagnosis of aleuchæmic leuchæmia, and in those few patients with other atypical findings in the peripheral blood. It was useful also in distinguishing chronic myelocytic leuchæmia from myelosclerosis; these are two diseases which may otherwise have identical clinical and hæmatological pictures. Hypercellular marrow occurred without exception in chronic myelocytic leuchæmia, whereas sternal marrow could rarely be aspirated in myelosclerosis.

The few patients with thrombocytopenia were found to have abnormalities in the total number of megakaryocytes and alteration both in the structure of these cells and in the platelets themselves. These changes conformed to the usual descriptions of the myelogram (Whitby and Britton, 1953). In all cases of hæmolytic anæmia a typical marrow pattern was found, and in anæmia due to iron deficiency typical findings were recorded in eight of 12 patients. The myelogram played little practical part in the diagnosis of these diseases.

In aplastic anæmia and agranulocytosis in our series most patients with the abnormal immature cells in the marrow already described survived for only a short time. These patients almost all had severe neutropenia, and the combination of severe granulocytopenia with this particular marrow abnormality appeared to be especially sinister. In the group that survived for longer the degree of neutropenia was not so great, the marrow was more normal in appearance, and lymphocytosis sometimes occurred. These factors were useful in prognosis.

The importance of sternal puncture has thus far been considered in a retrospective way; we have started with the established diagnosis and assessed the part that was played by marrow examination in reaching it. No account has been taken of the importance either of exclusion of possible diseases by this means or of negative results. This approach is the reverse of that obtaining in normal clinical practice, in which sternal puncture is suggested by the finding either of physical abnormalities or an abnormal blood count. The most important physical abnormalities which indicate that sternal puncture may be of value are splenomegaly, hepatomegaly, lymphadenopathy, bony tumours (especially if they are multiple), bony destruction (especially collapse of vertebræ), undiagnosed persistent skin lesions, and prolonged pyrexia. Marrow examination in these cases tends either to implicate or to exclude leuchæmia, multiple myeloma, myelosclerosis and lipoid storage disease. Certain peripheral blood findings also suggest that sternal puncture should be performed. These are macrocytic anæmia, leuco-erythroblastic anæmia, high erythrocyte-sedimentation rate (especially when this is associated with severe anæmia), aplastic anæmia, or a peripheral blood count in any way suggestive of leuchæmia. Bone marrow examination will here establish whether macrocytic anæmia is megaloblastic. The examination will help to diagnose a certain number of cases of multiple myeloma, myelosclerosis, myelocytic leuchæmia and disseminated cancer amongst those patients presenting with a leuco-erythroblastic blood picture. It will confirm the presence of myelomatosis in a few instances in patients with anæmia and rapid sedimentation of erythrocytes, and will sometimes assist prognostication in aplastic anæmia. It is our belief that all patients with leuchæmia should have their marrow examined. Information is gained about

the degree of cellularity, the secondary crowding effect upon hæmopoietic tissue, the possible occurrence of myelosclerosis, as a primary disorder or occurring secondarily to true leuchæmia, and the imminence of an acute termination.

The following points must now be emphasized, points proved many times in the current investigation. Firstly, thorough physical examination elucidates many cryptic cases. Secondly, sternal marrow is usually normal if the blood count is completely normal; and as a corollary to this careful study of the peripheral blood enables many diseases to be diagnosed with accuracy, in which case sternal puncture becomes interesting but merely confirmatory. Finally, lymph gland biopsy and skin biopsy are usually more informative than marrow biopsy in patients with lymphadenopathy or unusual skin lesions and a normal blood count.

Sternal puncture still has a wide application. It is a simple, quickly performed procedure which causes very little discomfort. However, it is only one step in the investigation of a hæmatological problem, it is less important than clinical examination or examination of the peripheral blood, and it is often of much less use than other laboratory tests. The information obtained from it tends to vary inversely with the thoroughness of the general appraisal and investigation of the patient. When it is properly used, confirmatory evidence of disease already suspected will often be supplied and helpful negative results obtained, but only rarely does it provide a short cut to diagnosis.

SUMMARY.

1. The results of a retrospective investigation to determine the place of sternal puncture in routine hæmatology are presented.

2. Information of greatest positive diagnostic value was obtained in patients with untreated pernicious anæmia, multiple myeloma, the leuchæmias and myelosclerosis, whilst confirmation of the diagnosis of hæmolytic anæmia and iron deficiency anæmia was also provided.

3. Sternal puncture was useful in excluding leuchæmia, multiple myeloma, myelosclerosis and the diseases of lipoid storage when the blood count, physical signs or other investigations indicated the presence of these diseases.

4. In this series sternal puncture was useful in assessing the prognosis in patients with depression of the bone marrow function, especially when neutropenia predominated. This investigation also revealed the following important points:

5. Examination of the marrow is of less importance than careful examination of the peripheral blood, and the marrow is usually found to be normal if the blood count is completely normal.

6. Lymph gland biopsy is more informative than marrow biopsy in patients with both lymphadenopathy and a normal blood count.

7. Sternal puncture is still a very useful test. When it is properly used, confirmatory patterns and helpful negative results will often be supplied, but only rarely does it provide a short cut to diagnosis.

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THE ÆTIOLOGY OF SCHIZOPHRENIA.

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THIS epidemiological study of schizophrenia was carried out with the specific intention of determining whether the distribution pattern in metropolitan and rural areas would offer any clues as to ætiology.

All schizophrenic admissions to the Receiving Houses at Royal Park and Ballarat, and to the Mental Hospitals at Kew, Sunbury, Larundel, Bundoora, Beechworth and Ararat were noted over a three-year period, 1952-1953-1954, and the patient's place of abode immediately prior to admission to hospital was plotted. When a patient was admitted to hospital more than once in this period, or had had a previous admission, only the first admission in these three years was counted. The majority of the patients (1645 out of a total of 1959) were admitted to Royal Park. There most of the diagnoses were made by two senior psychiatrists, whose diagnostic criteria were similar. When there was diagnostic doubt the case was excluded.

The distribution of places of origin was plotted for the following three main areas: (i) the Melbourne metropolitan area; (ii) the urban areas of Geelong, Ballarat and Bendigo; (iii) 82 country towns with populations of over 1000.

Rates of incidence were calculated from the population figures obtained from the last Australian census in June, 1954.

The Melbourne Metropolitan Area.

From this area, with a population of 1,471,379, there were 1201 patients. This gives a mean incidence of one in 1225 every three years, with an incidence variation of one in 687 every three years for Melbourne city to one in 1978 every three years for Moorabbin municipality; that is, the highest rate is approximately three times the lowest (see Table I).

It will be seen that the highest incidence is in the central city area, and this is followed closely by the immediately adjacent densely settled inner suburbs. This finding confirms that of Faris and Dunham (1939) for Chicago. They were able to show that there was a high schizophrenia rate at the centre of the city in areas of low economic status, with a decline to the lowest rates on the periphery of the city. This was in contrast to the distribution of manic-depressive illness, which showed a much wider scatter within the city and a tendency for positive correlations with areas of relatively high social-economic status. Faris and Dunham hold that the incidence of mental disease as a whole appears to be highest in those districts that apparently have the greatest amount of social tensions and conflict.

Dunham (1953), referring to these findings, asks the following questions: Are statistically significant rate differences in a given geographical area actually caused by differences of social life, or by the selection of cases, or by mobility of cases, or by statistical manipulation of the data? Is it that rate differentials represent differences in the degree of toleration by the various communities for persons with schizophrenic symptoms? Does the schizophrenic migrate to the bottom of the social scale or is he produced at the bottom of the social scale? Do schizoid

persons move frequently or are frequently moving persons more prone to develop schizophrenia?

Ødegaard holds that one of the symptoms of schizophrenia is a migratory tendency, and that therefore in a migrant population one will find a disproportionate number of schizophrenics or pre-schizophrenics.

An attempt will be made to answer these questions later, in the light of further data derived from the Victorian study and elsewhere.

If we refer once again to Table I and compare the fourth and sixth columns it will be seen that in general as the population density rises so does the incidence of schizophrenia. However, there are notable exceptions—for example, in the figures for Melbourne city, Port Melbourne, Sunshine, Heidelberg and Williamstown. These

TABLE I.

Melbourne Metropolitan Area.

Municipality.	Population.	Area. (Acres.)	Density. (Number of Persons per Acre.)	Number of Cases of Schizophrenia in 3 Years.	Frequency of Schizophrenia (One Case in 3 Years per *x* Persons).
Melbourne City	92,765	7740	*11·9*	135	687
Richmond ..	35,197	1430	24·6	49	718
Prahran ..	54,043	2320	23·3	68	795
St. Kilda ..	53,266	2049	26·0	66	807
Port Melbourne	12,984	2366	*5·5*	16	811
Fitzroy ..	30,251	923	32·7	33	917
Collingwood ..	27,133	1139	23·8	29	935
Brunswick ..	53,595	2719	19·7	55	974
Hawthorn ..	37,155	2400	15·5	36	1032
Sunshine ..	41,353	19,450	*2·1*	38	1088
South Melbourne	37,897	2303	16·4	34	1115
Oakleigh ..	24,286	3554	6·8	20	1214
Mordialloc ..	21,018	3351	6·3	16	1313
Northcote ..	43,566	2850	15·3	33	1320
Heidelberg ..	60,016	27,195	*2·2*	45	1334
Caulfield ..	75,194	5416	13·9	54	1392
Williamstown ..	29,247	3375	*8·6*	21	1393
Chelsea ..	16,779	3040	*5·5*	12	1398
Essendon ..	57,896	4000	14·4	41	1412
Footscray ..	58,039	4212	14·0	39	1488
Brighton ..	40,431	3332	12·1	26	1555
Preston.. ..	63,785	8800	7·2	39	1635
Sandringham ..	31,744	3740	8·5	19	1671
Coburg ..	62,146	4800	13·7	37	1679
Camberwell ..	90,357	8850	10·2	49	1844
Kew	31,523	3522	8·9	17	1854
Box Hill ..	35,515	5120	6·9	19	1869
Malvern ..	46,875	4022	11·6	24	1953
Moorabbin ..	65,276	12,320	5·3	33	1978

are explicable when we consider the way in which population density has been calculated—by dividing population figure (1954 census) by the area of the municipality. This takes no account of those parts of a given city which are non-residential. Melbourne city has huge non-residential areas—much of the business section, parks, gardens, main thoroughfares, river wharves and warehouses, railway marshalling yards and various public utilities. If the acreage of these sections of the city was subtracted from the total the resultant density figure would be much higher, perhaps twice or three times that given. The same remarks apply to Port Melbourne and Williamstown—the residential area is much less than the total. Sunshine and Heidelberg are outer suburban areas, and both still have large open spaces—more so in Heidelberg, since in Sunshine there are numbers of factories.

In view, therefore, of this source of error, it is probable that the actual relationship between the density of population and the frequency of schizophrenia is considerably closer than it appears.

The Urban Districts of Geelong, Bendigo and Ballarat.

The urban areas of Geelong, Bendigo and Ballarat have figures of incidence within the same order of magnitude as those for the Melbourne area.

The incidence in Geelong varied as follows: (i) 21 cases in a population of 20,342 for Geelong City—one in 969; (ii) six in 11,182 for Newtown and Chilwell—one in 1864; (iii) six in 19,721 for Geelong West City—one in 3287.

In Bendigo City the incidence was 20 in 28,722—one in 1436.

In Ballarat the incidence was 72 in 47,960—one in 666.

These particular findings will not be considered further.

Country Areas of Victoria.

In the country areas of Victoria 213 cases were plotted for 82 towns with a total population of 278,468. This gives a mean incidence of one case per 1307 persons every three years, which differs little from the mean metropolitan incidence of one in 1225. But the scatter of frequency is very much greater, as would be expected in view of the smaller numbers involved. The incidence varies from the highest—Cobram, with six cases in a population of 1696 in three years, or one case in 282—to the lowest—Seymour, with no cases in three years in a population of 3742.

Table II gives the figures for the 10 towns with the lowest incidence and for the nine with the highest.

These variations may or may not be significant. In addition to statistical analysis, there is another way of determining whether they are significant or merely due to chance distribution, and that is by their predictive value. *To determine this point a six months' survey was carried* out of all schizophrenic admissions to Royal Park, covering the first half of 1955.

Three towns with a high incidence in the previous three years were compared with six towns with a low incidence.

In the case of the three "bad" towns—Cobram, Leongatha and Healesville, with a total population of 6707—one should, calculating from the mean country incidence of one case per 1307 people in three years, expect five cases in the next three years, or less than one case every six

TABLE II.

Country Towns in Victoria.

Town.	Number of Cases.	Population.	Frequency (Cases in 3 Years).
1. Seymour	0	3742	0 in 3742
2. Numurkah	0	2195	0 in 2195
16. Moe	1	8760	1 in 8760
17. Echuca	1	5399	1 in 5399
18. Wodonga	1	5260	1 in 5260
19. Swan Hill	1	5191	1 in 5191
20. Ararat	2	7420	1 in 3710
21. Kyabram	1	3334	1 in 3334
22. Kerang	1	3225	1 in 3225
23. Beechworth	1	3156	1 in 3156
67. Benalla	8	6030	1 in 754
68. Mildura	15	10,967	1 in 731
73. Healesville	4	2708	1 in 677
74. Kyneton	5	3240	1 in 648
75. Camperdown	5	3208	1 in 642
76. St. Arnaud	5	3038	1 in 608
77. Leongatha	4	2303	1 in 576
81. Warracknabeal ..	8	3008	1 in 376
82. Cobram	6	1696	1 in 283

months. With the six "good" towns—Swan Hill, Wodonga, Echuca, Moe, Kerang and Seymour, having a total population of 31,577—there should be 24 cases in the next three years, or about four cases every six months.

The survey showed that the first three towns yielded three cases (one from each), whilst the last six towns with almost five times the population yielded the same number—three cases. Cobram, Leongatha and Healesville produced the number of cases that might have been predicted from their previous incidence rate rather than from the mean much lower rate for all towns. Certainly the figures are small, but they do suggest a real increased rate of incidence in these three towns.

On the assumption that the differences noted in Table II represented real differences in frequency and not merely the chances of distribution, an attempt was made to obtain some clue as to possible ætiological factors by visiting a number of the towns listed. These towns were Seymour, Numurkah, Cobram, Echuca, Kerang, Swan Hill, Warrack-

nabeal, St. Arnaud and Kyneton. Contact was made with clergy, medical men and police, and some impression was obtained of the physical characters as well as the social and economic status of each town.

This particular part of the investigation was singularly rewarding, in that it demonstrated very clearly the following points:

1. There was no relationship whatever between social and economic status or insecurity and frequency of schizophrenia. Cobram and Warracknabeal, for example, with a high incidence, are prosperous towns.

2. There was no relationship to population density, as is clearly evident in the Melbourne metropolitan area.

3. There was no relationship to family stability. For example, Cobram and Warracknabeal have a good standard of family life, whereas Echuca with a low incidence of schizophrenia had in 1954 considerable juvenile delinquency (80 cases), and in two days 19 children were charged with being neglected.

4. There was no relationship to discernible cultural differences. A "good" town was precisely similar to a "bad" town in any discernible cultural aspects.

5. There was no relationship between apparent incidence and distance from the nearest psychiatric hospital (except possibly in the case of Ballarat, which has its own psychiatric hospital).

6. There appeared to be no real difference in tolerance towards mentally ill people by their fellow-townsmen, and it did not appear as if the attitudes of local doctors towards mental illness had influenced apparent incidence.

Four Facts.

The search for a remediable ætiological factor in schizophrenia has for over half a century been unremitting but unavailing. Although from the time of Mott onwards there have been numerous studies directed to a possible organic basis, perhaps the major emphasis at least in latter years has been in the direction of possible psycho-pathological and sociological causes.

I believe there is now available sufficient factual evidence to indicate, if not the specific environmental factor responsible, at least the general direction in which it must be sought. Consider the four following facts and their implications in the light of this Victorian study:

1. Kallmann (1952) has summarized much of his previous work in his chapter on the genetic aspects of psychoses. Briefly, he has demonstrated that the tendency to develop a severe psychosis increases in proportion to the degree of blood relationship to a family member showing the given type of psychosis. In schizophrenia, if one uniovular twin develops the disease, the probabilities are six chances in seven that the other twin will also develop it, whereas for binovular twins and other siblings the chances diminish to one in seven. In short, his work demonstrates very clearly the importance of the constitutional factor.

2. Carothers (1947) was able to show that schizophrenia is 45 times commoner amongst American Negroes than in tribalized Kenya natives. This work, in turn, shows very clearly the importance of environment, but of course gives little or no clue as to what the environmental factor is. Carothers himself thought that the clue lay in the Kenya native culture, thinking and attitude to life. He states that:

> The consciousness of being an organic and well-protected member of the group gives the individual a definite self-consciousness and dignity . . . he does not suffer from social disabilities . . . nobody suffers from an inferiority complex.

3. Faris and Dunham (1939) demonstrated (and it is confirmed by this survey) that in a large metropolis, frequency is proportional to population density.

4. Hollingshead and Redlich (1952) have shown that the diagnosed prevalence of psychiatric disorders is related significantly to an individual's position in the class structure. If a social class exhibits the same proportion of schizophrenics as its own proportion to the general population, the index of prevalence for that class will be 100. If schizophrenia is disproportionately prevalent, the index will be above 100; if its incidence is disproportionately low in a social class, the index will be below 100. Hollingshead and Redlich show that the index of prevalence in the highest social and economic class level is only one-fifth as great as it would be if schizophrenia was proportionately distributed in this class, and that it is two and a half times higher in the lowest class than their proportional representation in the population. In other words, the index of prevalence is over 11 times greater in the lowest as compared with the highest class.

At this stage it is pertinent to attempt an answer to two of the questions propounded earlier. First, does the schizophrenic migrate to the bottom of the social scale, or is he produced at the bottom of the social scale? To quote the last-named authors again (1954), they found that there was little evidence of downward mobility as an explanation of the greater prevalence of schizophrenia amongst those in the poorest social and economic circumstances. Of their patients 91% were in the same class as their parents, and in fact there was much greater mobility upwards than downwards within the small minority who did change their class position.

Secondly, are there disproportionate numbers of schizophrenics in a migrant population? In Table III are given the countries of origin of schizophrenic patients admitted to Royal Park during the three-year period 1952-1953-1954. It will be seen that European (non-British) migrants produce a far higher percentage of schizophrenics than their proportional representation in the population as a whole. European migrants are responsible for 27·6% of the male admissions, but represent only 7·8% of the total male population of the State of Victoria. The corresponding figures for women are 11·3% of admissions and 5·3% of the population. Male Poles have the highest prevalence (over seven times their proportional representation in the community), followed by Russians and Ukrainians (combined figures), Yugoslavs and Czechs. The women, in general, have a considerably lower proportional incidence than the men, but still average over twice their proportional representation of the total female population. Again, Polish women head the list. It will be seen by comparing the census figures for 1947 and 1954 that the great majority of these people are recent migrants.

The answer to the second question is therefore strongly in the affirmative. In regard to the actual magnitude of the incidence amongst new European (non-British) migrants, the figure for women approximates to that of the highest metropolitan incidence of the population as a whole (that is, one case in 668 European female migrants every three years as compared with the over-all figure, male and female, or one in 687 for Melbourne City—see Table I), whereas that for men (one in 465), although higher than for the women, is still lower than the maximum country incidence. There is therefore no reason to postulate other environmental factors than those already operative in the population as a whole.

To revert to the four facts already mentioned: It is evident that some environmental influence acts adversely upon constitutionally predisposed individuals to produce schizophrenia. Our task is to identify and if possible combat this influence.

Consider the third and fourth propositions in relation to the survey of country districts of Victoria. It is evident that density of population in a metropolis bears a distinct relationship to frequency, but there is no such relationship in the country. The same observation holds with reference to economic status.

Why should population density and economic status be determining factors under urban conditions of living and not in the country areas? As was mentioned earlier, the country survey indicated that family stability, culture, economic and social status, and attitudes towards mental illness had no real ætiological significance—that is, psychological and sociological explanations seem to have no factual basis.

TABLE III.

Schizophrenic Admissions to Royal Park, 1952-1953-1954. Countries of Origin.

Origin.	Male Admissions.	Percentage of Total Male Schizophrenic Admissions.	Female Admissions.	Percentage of Total Female Schizophrenic Admissions.	Percentage of Total Population of Victoria of the Same Origin, 1954 Census.		Percentage of Total Population of Victoria of the Same Origin, 1947 Census.	
					Males.	Females.	Males.	Females.
Victoria Rest of Australia	390 62	57·0	490 126	71·5	82·9	87·0	90·2	92·5
England and Wales	38	4·8	54	6·2	5·5	4·8	4·8	4·1
Scotland	8	—	15	—	—	—	—	—
Ireland (including Eire)	13	—	4	—	—	—	—	—
Poland	59	7·4	23	2·7	1·04	0·7	0·2	0·17
Italy	41	5·2	17	1·9	2·25	1·2	0·55	0·25
Germany	12	1·5	14	1·6	0·9	0·88	0·26	0·16
Czechoslovakia	13	1·6	5	0·35	0·2	0·12	0·03	0·02
Yugoslavia	19	2·4	4	0·46	0·33	0·16	0·03	0·01
Greece	10	—	4	—	—	—	—	—
Russia Ukraine	5 10	1·9	2 3	0·58	0·35	0·3	0·07	0·056
Hungary	4	—	7	—	—	—	—	—
Roumania	4	—	1	—	—	—	—	—
Bulgaria	2	—	0	—	—	—	—	—
Latvia	9	—	2	—	—	—	—	—
Lithuania	3	—	2	—	—	—	—	—
Baltic States	1	—	0	—	—	—	—	—
Holland	3	—	3	—	—	—	—	—
Rest of Europe	6	—	6	—	—	—	—	—
Malta	7	—	6	—	—	—	—	—
Total Europe (including Malta and excluding British Isles)	209	27·6	97	11·3	7·8	5·3	1·9	1·0
Cyprus	5	—	2	—	—	—	—	—
Egypt	2	—	4	—	—	—	—	—
Elsewhere	17	—	10	—	—	—	—	—
Unknown	49	—	59	—	—	—	—	—
Grand total	792	—	861	—	—	—	—	—

Inevitably one turns towards possible physical difference in environment. I have already pointed out that during the survey of Victorian country towns some attention was paid to their physical appearance. The only observation that seemed to bear any relationship to distribution—it can be regarded as an impression only, but a distinct one—was the incidence of fruit trees in number and quality. This applied particularly to stone fruits—peaches, apricots, plums, cherries, almonds and walnuts.

Those towns with the lowest incidence were notable for the abundance of fruit trees in home gardens. Seymour was well supplied in this respect. Numurkah is quite embowered in home garden fruit trees. The big Murray Valley towns of Echuca, Kerang and Swan Hill were also rich in such trees. The major exception to the rule was Cobram. This town too had an abundance of fruit trees, but the vast majority were citrus. It is the only major citrus growing town on the Victorian side of the Murray for several hundred miles, until one comes to Mildura; this is a city which, like the smaller Cobram, also has a relatively high incidence of schizophrenia. Warracknabeal, St. Arnaud and Kyneton, towns with a high incidence of schizophrenia, although by no means devoid of home garden fruit trees, had nothing like the profusion seen in the preceding towns. The poor quality of what trees there were was even more noticeable.

Now, an hypothesis based on the possibility of protective foods would certainly explain the known facts of distribution. At least as far as Victoria is concerned, the distribution rules out staple foods as protective; there are wide variations in country towns with the same staples. It is unlikely that protective value is strictly limited to one particular article of food, but those relatively few foods which are protective would be limited in production and distribution. Consumption would be subject to such influences as custom, personal inclination, price and availability. Now, if stone fruits have appreciable protective value, their production and distribution in Victoria would explain the known facts of schizophrenia distribution. Domestic stone fruit tree population is in the Melbourne area proportional to population density. As the value of land goes up towards the centre of a big city, so do the number and size of home vegetable gardens diminish. But not so in the country areas. There, other factors such as climate, soil and water supply are operative. This hypothesis would explain, too, the high incidence amongst our migrant population—for example, the large number of cases (25) from the hutments of Bonegilla, as compared with one case in the period from the nearby large town of Wodonga.

There is little doubt, too, that the diet of the Kenya native must differ widely from that of the American Negro.

In this connexion Böök's (1953) work is of interest. He has shown that the general morbidity risk for schizophrenia for an isolated North-Swedish population living north of the Arctic Circle exceeded 2% (which seems an enormously high figure), whilst the incidence of manic-depressive psychosis was reported to be very low. Such an observation is easily explicable on the foregoing hypothesis.

It might be argued that if a physico-chemical explanation was to be put forward, why should the possibility of a relationship to trace element distribution not be considered. That is a reasonable proposition. The only trace element which has been systematically mapped throughout Victoria in the water supply of the various towns is fluorine. There is no relationship whatever between fluorine concentration in water supply and the incidence of schizophrenia.

The Victorian State Laboratories have checked the distribution of schizophrenia with the soil analysis for various districts. They have been unable to establish any significant correlation with any particular soil characteristics or crops, except that there appears to be a rather higher incidence of schizophrenia in the wheat belt of the Mallee and Wimmera and a rather lower incidence along the grazing lands of the Murray Valley. But of course

there was not sufficient local information available concerning "backyard" crops in various areas. This could be obtained only by a personal survey of towns.

Summary.

A survey of the distribution of schizophrenia in Victoria is discussed in relation to other known facts regarding the incidence of schizophrenia under various conditions. It is pointed out that psychological and sociological explanations are inadequate, but the existence of a protective factor in diet present in foods of relatively limited production and distribution, in the semi-luxury or at least the non-staple category, would explain the distribution of schizophrenia better than any other postulated cause. When consumption of protective foods falls below a certain minimum level those with a constitutional predisposition develop frank schizophrenia.

Acknowledgement.

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URINARY SODIUM–POTASSIUM RATIOS IN HOT ENVIRONMENTS.

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THE adrenal cortex has been shown to take some part in acclimatization to heat (Sundstroem, 1927; Conn, 1949). During heat adaptation the concentration of sodium in sweat is reduced (Conn, Johnston and Louis, 1946) and extracellular volume is increased (Bazett, Sunderman, Doupe and Scott, 1940). Both of these changes in electrolyte distribution may follow adrenal cortical activity. The isolation of aldosterone (Grundy, Simpson and Tait, 1952) with its specific action in lowering the urinary sodium-potassium ratio, raises the possibility that sodium distribution and turnover during heat acclimatization are controlled by this hormone. Aldosterone would be likely to reduce urinary sodium loss, relative to potassium, when sodium is lost in sweat.

In studies on man exposed to high ambient temperatures it was observed that the sodium-potassium ratio of the urine fell to less than 0·5 within two hours of heating. Robinson *et alii* (1955) and Kanter (1955) found that urinary sodium output decreased during heating of human subjects. This acute effect resembles the rapid lowering of sodium-potassium ratio produced by aldosterone, so further experiments were made. While our observations were in progress Collins, Hellmann, Jones and Lunnon (1955) reported finding increased amounts of aldosterone in the urine of heated subjects.

Three types of situation have been studied in which response to a hot environment involved a fall in the urinary sodium-potassium ratio. These conditions were acute experimental heating, transfer of subjects from southern to northern latitudes in Australia, and seasonal changes in normal subjects in Brisbane. Estimations were made on twenty-four hour urine collections, and electrolytes were measured by flame photometry.

Acute Heating.

Two adult male subjects, heated for five hours at 106° F. (41° C.) dry bulb, 85° F. (35° C.) wet bulb (40% relative humidity) on three occasions, sweated more than two litres during each exposure. The equivalent of three miles' walking was undertaken during heating. Table I shows that there was a reduction in the urinary sodium-potassium ratio to one-fourth of that found prior to heating. The sodium-potassium ratio remained low for two days with gradual recovery. One or two days of relative sodium excretion followed during normal environmental temperatures. In winter the ratio fell less than in summer, and by the third day after the subjects were heated, sodium output was higher than in summer. Similar lowered sodium-potassium ratios have been found in the urine of heated Merino sheep.

Tropical Work.

One subject in Melbourne during winter and spring showed a urinary sodium-potassium ratio of 3·2 ± 0·9. In Brisbane in the corresponding season of the year his sodium-potassium ratio was 2·3 ± 0·54. Similarly a Brisbane subject yielded a mean sodium-potassium ratio of 1·21 ± 0·30 during four days prior to flying north. At Julia Creek (latitude 22° south, with daily maximum air temperatures between 105° and 110° F.) the ratio fell to 0·42 in the first week, but rose to 1·18 in the second week. Similar findings in the summer of 1956 were derived from three Brisbane subjects studied for ten days before they travelled to Julia Creek, for eight days in that environment and for ten days subsequently in Brisbane. An

TABLE I.

Effect of Acute Exposure to 41° C. on Urinary Sodium-Potassium Ratio.

Ambient Temperature.	Days.	Sodium-Potassium Ratio.					
		Subject I.			Subject II.		
		January.	March.	July.	January.	March.	July.
50° to 90° F.	−1	1·61	1·55	1·47	1·30	1·65	1·36
106° F. for five hours ..	0	0·44	0·33	0·57	0·34	0·40	0·55
50° to 90° F.	+1	0·62	1·10	1·03	0·92	0·50	2·50
50° to 90° F.	+2	1·04	1·58	1·60	1·10	1·20	3·32
50° to 90° F.	+3	1·23	1·96	2·10	—	2·42	1·62

average reduction of the urinary sodium-potassium ratio by 26% took place during the days in the tropics (with temperatures over 105° F.) relative to values found in Brisbane with maximum temperatures of 85° to 90° F. On return to a cooler environment there were one or two days of high sodium excretion.

Hard work, for at least an hour, at temperatures over 80° F., reduces the sodium output, although no change may occur at the same ambient temperature without exercise. Five men working sheep in air temperatures over 105° F. at Julia Creek yielded a mean sodium-potassium ratio of 1·37 ± 0·43 during four working days, and during four subsequent days' rest the ratio rose to 2·52 ± 0·99. This difference is significant ($P > 0·001$). One subject changed from a ratio of 1·51 during work at 110° F. to 5·0 during rest in cooler weather.

On the other hand, eight highly acclimatized cane workers who cut 47 tons of cane each per week in December (90° F. dry bulb temperature and 60% relative humidity) showed a mean urinary sodium-potassium ratio of 2·33 during sixteen man-days of work. They were equilibrated on a sodium chloride turnover of about 18 grammes each day.

Seasonal Changes in Urinary Sodium Potassium Output in Brisbane.

Seven subjects (four male and three female adults) provided 692 samples from twenty-four hour urine collections through the year. All subjects worked at the laboratory

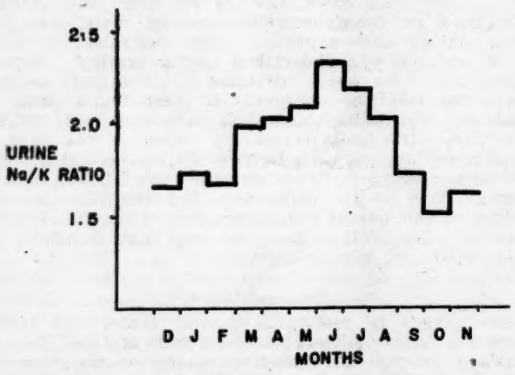

FIGURE I.

Mean monthly urinary sodium-potassium ratios (692 samples) are plotted against time, in months, for 1955. Seven adults in Brisbane (27·5° south latitude) were studied. There is a significant difference ($P > 0·001$) between the May, June, July ratios, and those for October, November and December. October was an unusually hot month.

in semi-sedentary occupations. Each month there was an average of 58 samples, and the seasonal distribution of the sodium-potassium ratio is plotted in Figure I. The three months with the lowest ratios (October, November, December) showed a mean of 1·59 ± 0·54, and the three months with the highest ratios (May, June, July) averaged 2·18 ± 0·72. This difference is significant at the $P > 0·001$ level. The lowest mean ratio occurred in October (1·53) and the highest in June (2·32).

Discussion.

These three ecological approaches indicate that heat and work cause the human kidney to retain sodium and allow potassium excretion, during the early stages of adjustment. Over an hour of work and heat seems necessary to produce the effect. Six-minute bursts of maximum effort at temperatures near 80° F. are, for instance, not associated with sodium retention. The low sodium-potassium ratio in urine formed during heating (Table I) resembles the urinary sodium-potassium ratio found by Llaurado (1955) during the twenty-four hours following major operation. This effect seems primarily to be due to aldosterone activity.

Both aldosterone and desoxycortone reduce sodium excretion, and lower the urinary sodium-potassium ratio. Cortisone and hydrocortisone may also contribute to this effect. It is likely that these human reactions to heat or surgery are autoassays of aldosterone, but verification of this is not yet complete.

The sodium-potassium ratio falls abruptly when heat and work cause sweating under experimental conditions. In the early stages of adjustment to heat, sodium is differentially retained. This was seen in acute exposure to heat or when the first hot weather of spring was associated with low ratios in October. This would provide sodium for sweat and for the increased extracellular fluid volume that occurs in heat acclimatization. The seasonal difference in sodium-potassium ratio is presumably related to the sodium deviated from excretion by the kidney, to the sweat. After a period of renal sodium saving in the heat there is a period of relative sodium excretion on return to cooler conditions.

As acclimatization proceeds there seems to be adjustment of the sodium turnover rate. Acclimatized cane cutters showed the relatively high mean urinary sodium-potassium ratio of 2·33 in summer, which suggests that they had been equilibrated to a high salt intake and turnover, the salt being derived from high rates of food intake necessary for their work. However, extra salt caused œdema, so that there probably was aldosterone activity, saving about eight grammes of salt for sweat from the average intake of 18 grammes per day.

In these field observations there are many uncontrolled variables, but there appears also to be a consistent pattern of relative sodium retention in acute heat. It is likely that aldosterone is the main hormone responsible for the sodium excretion pattern, and assays of this hormone are in progress.

Summary.

1. Acute heating to 106° F. for five hours reduced the urinary sodium-potassium ratio from 1·50 to 0·40 for the twenty-four hour output. The reduction in sodium output was greater in summer than in winter.

2. Transfer of adults from cool to hotter areas of Australia was associated with a reduction of the urinary sodium-potassium ratio.

3. Seven subjects in Brisbane showed a reduction from a winter mean maximum ratio of 2·32 to a summer mean of 1·53 (significance of difference $P > 0·001$).

4. It is likely that heat acclimatization is associated with aldosterone activity.

Acknowledgements.

I am grateful to the subjects who patiently provided samples, and to Mr. A. Meder for his work with photometry.

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THE INCIDENCE OF THE MAJOR FRACTURE PATTERNS IN THE FACE.

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WITH present-day congestion, speed and reckless behaviour on our roads it is common knowledge that motor accidents are taking an increasing toll of the youth of this country. Facial injuries figure so prominently in road accident victims that their timely and adequate management is now a major problem. Proceedings of third party insurance litigation and awards made for disfigurement bear testimony to the attention focused on this particular type of injury.

The early and correct diagnosis of these injuries is essential if disfigurement and functional disability are to be minimized by effective primary treatment. It is hoped to further this end by indicating which of the common patterns of facial fracture usually result from different types of accident.

Material Investigated.

To determine the incidence of the different fracture patterns resulting from various types of accident the histories were studied of all patients with facial fractures admitted under or referred to the Facio-Maxillary and Plastic Surgery Department of the Royal Melbourne Hospital from July, 1946, to December, 1954, inclusive. Altogether 450 case histories are included.

Many of these patients were admitted to hospital because of other injuries sustained, but in most cases admission was for treatment of the facial injury. Conversely, it is realized that most of the patients with lesser degrees of facial injury are treated as out-patients, and doubtless many of these injuries escape detection altogether.

Better perspective is given to this series of major facial injuries when considered in the light of the overall incidence of facial trauma as treated at this hospital.

In the year ended December 31, 1954, the records show that 37,860 patients were examined in the Casualty Department; of these 16,110 had sustained some form of traumatic injury, and in 2233 cases the injury involved the face. Of these 2233 facial injuries, 1847 involved soft tissues only, 186 were simple fracture of the nose, and 200 were more severe fractures, of which 108 required direct admission of the patient to hospital.

The 450 cases of facial fracture considered in this paper are mainly drawn from the last group of those in which the patients required admission to hospital. These more severe injuries clearly comprise less than 10% of all facial injuries seen at this hospital.

Classification Used.

The terminology in general use is that introduced by McIndoe (1941) and elaborated by Rank (1944), associating the type of fracture with the direction of violence rather than with specific bones.

Upper facial fractures fall into two main groups depending on the direction of impact. These groups are as follows:

1. Naso-maxillary or frontal violence fractures. These vary in degree from the simple broken nose to those fractures involving the shock-absorbing mechanism of the antral superstructure, with a resultant freely mobile or impacted central maxillary segment. Often there are associated fractures into the floor of the anterior cranial fossa.

2. Malar-maxillary or lateral violence fractures. In these the malar prominence receives the impact, and the resulting fractures range from a fractured zygomatic arch to the quite unstable lateral maxillary segment with comminution of both orbital floor and antral wall.

Mandibular fractures have been considered as a whole. Although it is recognized that variations in direction of the force produce different mandibular fracture patterns, there has been no subdivision of this large group of fractures, in order to avoid confusing later comparisons with the two broad groups of maxillary fractures.

Fractures confined to the frontal bone are excluded, because the frequency of underlying brain damage clearly favours their management by our neurosurgical colleagues.

Distribution of Fractures.

The distribution of the fractures in this series is as follows:

Naso-maxillary fractures (including 17 with a fractured mandible), 65 (13%).

Malar-maxillary fractures (including 26 with a fractured mandible), 137 (28%).

Mandibular fractures, 290 (59%).

This makes a total of 492 fractures in 450 patients.

In actual fact the naso-maxillary group is by far the largest in any comprehensive series of facial fractures, but the common broken nose, simplest of the naso-maxillary fractures, has been omitted from these figures. As indicated earlier, the number of broken noses seen *per annum* is almost equal to all other facial fractures together, but, as these patients are not usually admitted to hospital, no reliable data for comparison can be obtained.

Type of Accident.

In 450 patients with major fractures of the face the causative accidents can be classified thus:

Road accidents (45% of total): motor accidents, 145; motor-cycle accidents, 30; bicycle accidents, 10; pedestrian accidents, 18.

Brawls (27% of total): kick, 15; punch, 107.

Falls: 55.

Sport: 31.

Miscellaneous: 39.

The association of the fracture patterns with type of accident can be shown by a block table (Figure I).

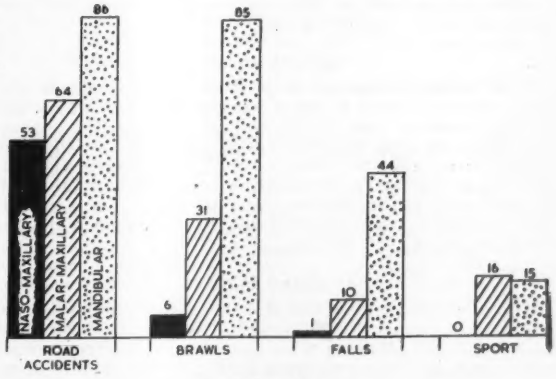

FIGURE I.

Distribution of the three main fracture patterns in the important accident groups.

Road Accidents.

Road accidents produced most of the severe fractures because of the great forces involved. The injuries frequently included severe lacerations from glass fragments, and of the 203 patients in this group 105 sustained associated head injury.

We note that 83% of the naso-maxillary fractures are in this group. This can be correlated with the nature of these accidents, in which so often a crushing force is applied to the face with little warning. It is the front seat passenger who most often suffers, being thrown violently forward against the dashboard or windscreen. In the 10 patients who fell from bicycles no naso-maxillary fracture had occurred. The warning given in the time of

falling apparently allows some protection by turning of the head. By virtue of the different forces involved and their direction, only the less severe malar-maxillary and mandibular fractures occurred in cyclists.

Brawls.

The more localized application of a fist, a boot or a bottle is clearly more effective in producing a fractured mandible or a depressed malar bone. Only six naso-maxillary fractures occurred in this group of 122 patients, although, as indicated earlier, the common broken nose would outnumber all this group if included.

Falls.

Although many of the patients whose injury was due to a fall were unconscious during the fall, the impact of the face is usually lateral, and most of the patients sustained mandibular or malar-maxillary fractures. There was only one naso-maxillary fracture in 55 patients, and it is interesting that the patient concerned had fallen some distance from scaffolding, whereas most of the other falls were of domestic or epileptic origin.

Sport.

Again, in sport the localized blow of a ball, a stick or an opponent's elbow produced only mandibular and malar-maxillary fractures in 32 patients. No naso-maxillary type occurred beyond the broken nose.

Miscellaneous.

A significant group in the miscellaneous category is composed of nine patients kicked in the face by a horse; this accounts for four major naso-maxillary injuries. This indicates not only the force required but the totally unexpected nature of such accidents causing severe naso-maxillary fractures. It seems that when some warning is registered, the head is turned aside, so that the less severe malar-maxillary or mandibular fractures result. The rarity of gunshot wounds in a civil hospital is another feature. In this series only 0·4% of injuries were due to missile wounds, in contrast to 16% in an unpublished wartime series of Rank and Wakefield.

Age Incidence.

It is to be emphasized that major facial fractures are most common in that group of our population on which the country depends most for its productive capacity. About two-thirds of each type of fracture occurred in the age group from twenty to forty years. The distribution of patients in this age group and the percentages of the total in each case are as follows: naso-maxillary fractures, 41 (63%); malar-maxillary fractures, 82 (60%); mandibular fractures alone, 158 (63%).

Associated Injuries.

The importance of a complete physical examination of any injured person is highlighted in this group of patients. In the patient admitted with an obvious limb fracture or concussion, the facial fracture may be detected only after some days. By that time the optimal period for obtaining simple correction may be past, and perhaps a general anæsthetic has already been given for other purposes. After the first two weeks increasing difficulty is found in obtaining satisfactory reduction of both maxillary and mandibular fractures. Furthermore, delay in adequate fixation of fractures of the body of the mandible, some of them no more than cracks, is by far the commonest cause of osteomyelitis of the mandible that we see.

Failure to detect the facial injury and to assess correctly its implications may endanger the patient's life. Although nine of the 12 deaths in this series were due to the associated injuries, three were due directly to meningitis complicating naso-maxillary fractures, the nature and extent of which were for some time undetected.

Similarly, a patient with an obvious facial injury must be carefully searched for other injuries if we are not to miss the fractured pelvis, traumatic hæmothorax, or skull or limb fractures whose management must be coordinated in time and place with that of the face fractures.

Injuries associated with the 450 facial fractures (exclusive of lacerations) were as follows:

Head injury: total, 123; concussion alone, 63; proven fractured skull, 60.
Upper limb fracture: total, 42.
Lower limb fracture: total, 26.
Chest injury: total, 13.
Miscellaneous: total, 14; eye lost, 7; ruptured viscus, 3; fractured pelvis, 4.

It is to be noted that in 27% of this series of facial fractures the patients also had some degree of associated head injury. In those patients injured in road accidents the figure was found to be over 50%. Hence the timing and sequence of correction become matters of nicety of judgement and perspective.

Discussion.

Two important aspects of this problem require some brief comment.

The first is the early and accurate diagnosis of facial injuries after any accident. Clearly there is a two-way obligation in diagnosis. We must constantly be aware of the possibility of other injuries in those patients admitted to hospital for their facial injury. Conversely, the accident victim admitted with obvious injuries elsewhere should always be examined specifically for facial injury. In both these cases the nature of the accident is some guide to the type of fractures most likely to be present. It is not widely recognized how much help a careful history can give in the assessment of traumatic lesions. Although in many patients the precise nature of the accident cannot be obtained, where it is possible it should include the attitude of the body, the position of the head at the moment of impact, the nature of the blow, and whether there was any warning. It has been found that these factors help to indicate the type of facial fracture incurred.

The second aspect of importance is the allotment of responsibilities in view of any associated injuries. The priority of surgical intervention in those cases complicated by injuries elsewhere—for example, intracranial, thoracic or abdominal—has to be decided by early consultation and cooperation. The charge and responsibilities for these cases should be clear. When there is also abdominal injury, clearly control of the case rests with the general surgeon, or, if the head injury is paramount, with the neurosurgeon; likewise when the face injury is paramount, the plastic surgeon has charge of the case; but whoever thus assumes responsibility for the patient does so for all his injuries and should be competent to manage the treatment as a whole. Dental advice and assistance on intraoral procedures and appliances is an essential part of the management of many facial injuries, but again this facet of treatment is to be fitted into the general plan of the patient's care by the surgeon responsible. In recent years early discussion between the surgeons involved has lessened delay in starting treatment, and frequently combined operations at the primary stage have saved much in time and avoided repetitive general anæsthetics, as well as ensuring better results.

Finally, no discussion of this type of injury can be complete without a plea for more general education of the driving public in self-preservation within the car itself as well as in road manners. Such elementary rules as confining children to the back seat and not allowing the front seat passenger to lean forward near the dashboard when in traffic would lessen the risk of smashing into the dashboard. Automobile construction could allow for incorporation of a soft rubber shock-absorbing cover for the dashboard for motorists with some consideration for the passenger's face. The use of some sort of restraining harness approaches the ideal.

Anyone who has had experience of treating facial injuries overseas must be impressed by the higher incidence here of drunken brawls and falls, both public and domestic. These also would be expected to diminish in number with education of the public in more civilized drinking habits than those for which this country is at present noted.

Summary.

1. Almost 50 facial injuries per week arrive at this hospital. Severe facial fractures occur in less than 10% of these, and this group has been further examined.

2. Four hundred and ninety-two facial fractures in 450 patients have been classified according to the three main fracture patterns—namely, naso-maxillary, malar-maxillary and mandibular.

3. The distribution of these main fracture patterns according to the type of accident responsible has been shown, with a clear preponderance of the more severe naso-maxillary type in road accidents.

4. The incidence of associated cerebral, visceral and skeletal injuries in these patients is shown and their importance in management discussed.

Acknowledgements.

We would like to thank Mr. B. K. Rank for his advice during this work. We also thank the honorary medical staff of the Royal Melbourne Hospital for permission to peruse the histories of those patients not admitted directly to the Plastic Surgery Department.

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Reviews.

Clinical Toxicology, by Clinton H. Thienes, M.D., Ph.D., and Thomas J. Haley, Ph.D.; Third Edition; 1955. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 8" × 5¼", pp. 458, with 16 illustrations. Price: 71s. 6d.

"CLINICAL TOXICOLOGY", by Clinton H. Thienes and Thomas J. Haley, has now appeared in its third edition. The work, which has been primarily written as a classroom text-book and as a guide for the general practitioner, has been thoroughly revised, enlarged and illustrated.

The work is divided into nine sections, which deal with convulsant poisons, central nervous system depressants, peripherally acting nerve poisons, muscle poisons, protoplasmic poisons, poisons of the blood and hæmatopoietic organs, the principles of treatment in poisonings, an outline of diagnosis based on symptoms, and the chemical diagnosis of poisoning, respectively.

The various poisons, which are grouped according to their major toxic action, are briefly discussed. Although the discussion is brief, it is well set out, systematic and easy to read. The work is up to date and includes a discussion of the more important toxic agents which have recently come into use.

Australian readers will be interested, apart from the more general toxicology, in the contribution on snake bite and the injury caused by the stingray. There is much that is very useful in this manual for the general practitioner and the student.

Cardiac Diagnosis: A Physiologic Approach, by Robert F. Rushmer, M.D.; 1955. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 10" × 6¼", pp. 454, with many illustrations. Price: £5 15s.

IN this book the author explains the function and control of the heart under normal and abnormal conditions and applies the knowledge to cardiac diagnosis.

He devotes Part I to the function of the normal cardiovascular system, Part II to its regulation, and Part III to congestive cardiac failure. Then in Part IV he applies these principles to the problems of cardiac diagnosis. In Part V he considers in detail the diagnosis of myocardial ischæmia, myocarditis, valvular disease, congenital heart disease and possible heart disease.

He points out that cardiac catheterization and surgery have shown how often diagnoses have been incorrect, thus demanding improved diagnostic methods. He states that diagnosis is still too largely dependent upon correlation of specific disease processes with characteristic patterns of signs and symptoms. However, different people react differently to the same disease process, so he urges the physiological approach and analysis of functional effects.

This leads to a better understanding of what is actually happening.

In explanation of a physiological process he does not enter into many controversial theories, but usually describes the most reasonable and adequate one available. This method is perhaps the best one for teaching the student the principles which he is later to employ in diagnosis. It will be observed that he has illustrated his points by no less than 239 figures.

Many of these figures present the subject in a manner most likely to impress the facts on the student's mind. This scheme is not merely a gesture to the modern trend toward visual aids, but it also serves a valuable purpose in providing the means for quick reference to a point in question instead of the inquirer having to reread the text.

This book will prove of value to any cardiologist who reads it, and it most certainly should be included in all medical libraries.

Body Fluids in Surgery, by A. W. Wilkinson, Ch.M., F.R.C.S.E.; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 8½" × 5½", pp. 221. Price: 16s.

THIS small book is written by a practical surgeon and surgical teacher for practical surgeons and others who are responsible for the care and management of surgical patients. The early chapters cover concisely the basic facts concerning the body fluids in health and disease. There are chapters on the content and distribution of water in the body, sodium, potassium, acid and base balance, the metabolic effects of surgical injury and acidosis and alkalosis. Most of the book deals with the clinical aspects.

Subjects which are discussed include shock, œsophageal obstruction, the loss of gastric and intestinal secretions, preoperative and post-operative management, renal disease, anuria and burns. The chapters on the diagnosis and treatment of these disturbances include discussion of plasma substitutes, parenteral feeding, and water and electrolyte replacement. Perhaps the author might well have been a little more explicit in regard to the details of ward management, and of the day-to-day problem of the calculation of the patients' requirements in fluids and electrolytes.

This is an interesting book for those concerned with this subject.

An Atlas of Bone-Marrow Pathology, by M. C. G. Israëls, M.Sc., M.D., F.R.C.P.; Second Edition; 1955. London: William Heinemann (Medical Books), Limited. 9¾" × 7¼", pp. 95, with 13 plates. Price: 30s.

IN England it is common to find consultants who have studied and become proficient in some branch of pathology, usually as a background to some research project. For such, an atlas is a very useful book, especially when, as in Israëls's "Atlas of Bone-Marrow Pathology", the accent is on the identification of cells. In Australia, on the other hand, few clinicians would care to examine bone marrow aspirates themselves.

Israëls, in the introduction, states that "the atlas has been designed in the hope that it will persuade more pathologists to undertake bone-marrow studies, and more physicians to ask for bone-marrow investigation in cases where it can help". Since the first edition appeared in 1948, hæmatology has advanced considerably. Pathologists here are accustomed to examine bone-marrow films and clinicians do not hesitate to ask for such examinations. Therefore, it seems that this atlas would be of help only to pathologists-in-training and the occasional clinician who desires to know the appearances of bone-marrow cells.

There have been a few additions in the second edition. Amongst these are "acute reticulum cell leukæmia" and "myeloid reticulosis". Presumably the former is a leuchæmia which is manifested by cells which have not yet differentiated to the lymphoblastic or myeloblastic series. Myeloid reticulosis, a confusing term, must be follicular lymphoblastoma involving bone-marrow.

The cells which are called megaloblasts seem to be similar to proerythroblasts, and indeed, an example of a proerythroblast comes from the marrow in pernicious anæmia. It is high time that an authority banished megaloblasts.

The megakaryocytosis of the bone marrow in the presclerotic stage of myelofibrosis is not mentioned.

Notwithstanding these few defects, this is a first class atlas, and with its aid it should be possible to teach oneself to interpret bone marrow films. The illustrations, which are reproductions of water colours, are true to life. Art paper is used throughout and the general production is of a high standard.

Fractures of the Facial Skeleton, by N. L. Rowe, F.D.S.R.C.S. (Eng.), L.R.C.P. (Lond.), M.R.C.S. (Eng.), L.M.S.S.A. (Lond.), H.D.D.R.C.S. (Edin.), and H. C. Killey, F.D.S.R.C.S. (Eng.), L.R.C.P. (Lond.), M.R.C.S. (Eng.), L.M.S.S.A. (Lond.), H.D.D.R.C.S. (Edin.), with a Foreword by Sir Reginald Watson-Jones, B.Sc., M.Ch.Orth., F.R.C.S., F.R.A.C.S. (Hon.), F.A.C.S. (Hon.); 1955. Edinburgh and London: E. and S. Livingstone ,Limited. 10" × 7", pp. 960, with 1231 illustrations. Price: £6.

THIS is a large volume of more than 900 pages arranged in three parts. Part I covers very thoroughly all theoretical and practical aspects of fractures of the mandible; Part II deals less clearly but none the less completely with fractures of other face bones; and Part III is an aggregate of odd chapters variably related to these subjects and contributed by a number of other writers. These cover related aspects of anæsthesia and radiology, eye and head injuries, as well as details of soft tissue repair and delayed skeletal reconstruction. Some of these chapters overstretch the scope of the title.

The book is of a reference nature and rather difficult to read straight through. The introduction, a case review, is unfortunate, for much of its dull detail would be better as an appendix. It might well have been replaced by the last chapter, a good historical review.

All the main subject matter written by the authors themselves is clearly set out and profusely illustrated. It thoroughly covers the whole range of standard British practice in the management of facial injuries. There is little of critical review or of personal preferences among diverse methods of treatment, so that many less frequently needed, obsolete or alternative procedures perhaps gain more importance than they deserve.

The chapters on fractures of the mandible are the best in the book, but fractures of the upper facial bones are perhaps confused and over-classified on a basis of theory rather than of clinical practice. The sections which expound details of dental techniques so clearly are so much better than all other aspects of the book that it is a pity the authors attempted the impossible, so making what is rather a library reference tome than a book which all interested in this type of work would want and could afford to own because of the valuable recorded practice and perspective of two such experienced men.

With such a large number of illustrations which are clear and to the point, the book could again have been reduced in size by the omission of many poor illustrations which serve little purpose. The frequently recurring model fractures are irritating and some are not clear, Figure II, 11, for example. So too such Figures as VIII, 18–22, do not present simple points clearly.

The production of the book leaves nothing to be desired except in some very poor colour reproductions as on page 40. The work is altogether monumental and commendable—its reduction and some minor revision would make it really first class.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"The Christchurch Hospital Medical Manual", edited by C. T. Hand Newton, D.S.O., M.D., F.R.A.C.P., F.R.C.S. (Edin.): First Edition, July, 1945; Second Edition, March, 1947; Third Edition, January, 1951; Fourth Edition, April, 1956. Christchurch: N. M. Peryer, Limited. 7¼" × 5", pp. 182. Price: 27s. (New Zealand currency).

This book deals with certain aids to clinical diagnosis, and the dieting of patients in the wards.

"The Royal Melbourne Hospital Medical Manual"; Editorial Committee, Geoffrey A. Penington, M.D., B.S., Melb., F.R.A.C.P., Kenneth J. Grice, M.D., B.S., Melb., M.R.C.P., F.R.A.C.P., Patrick N. O'Donnell, M.D., B.S., Melb., M.R.A.C.P., Berta Ungar, M.D., B.S., Melb., Charles B. MacGibbon, Ph.C., F.P.S., Vic., and William R. Mackay, Ph.C., M.P.S. (G.B.), F.P.S., Vic.; Second Edition. 7" × 4¾", pp. 342.

This book is intended for students and practitioners; in the present edition the metric system has been adopted.

"Collagen Diseases: Including Systemic Lupus Erythematosus, Polyarteritis, Dermatomyositis, Systemic Scleroderma, Thrombotic Thrombocytopenic Purpura", by John H. Talbott, M.D., and R. Moleres Ferrandis, M.D. New York: Grune and Stratton, Inc. 8¾" × 5½", pp. 241. Price: $6.50.

The work is beautifully illustrated with coloured plates, photomicrographs and reproduction of X-ray films.

"Campbell's Operative Orthopædics"; Editor, J. S. Speed M.D.; Associate Editor, Robert A. Knight, M.D.; Third Edition; 1956. Volumes I and II. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 10" × 7", pp. 2297, with many illustrations. Price: £22.

There are 17 collaborators, most of whom are members of the staff of the Campbell Clinic and Faculty of the University of Tennessee College of Medicine, Memphis, United States of America.

"Clinical Laboratory Diagnosis", by Samuel A. Levinson, M.S., M.D., Ph.D., and Robert P. MacFate, Ch.E., M.S., Ph.D.; Fifth Edition; 1956. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 9¼" × 6", pp. 1246, with many illustrations. Price: £6 17s. 6d.

Intended for the medical student, the intern, the resident physician, the practising physician and the medical technologist.

"The Surgical Clinics of North America"; 1956. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. New York Number. 9" × 6", pp. 296, with many illustrations. Price: £8 2s. 6d. *per annum* in cloth binding and £6 15s. *per annum* in paper binding.

The number is a symposium on new adjunctive measures in surgery; there is one additional article. The symposium comprises 19 chapters; there are 31 authors.

"Clinical Laboratory Methods and Diagnosis: A Textbook on Laboratory Procedures with Their Interpretation", by R. B. H. Gradwohl, M.D., D.Sc.; Fifth Edition, Volumes I and II; 1956. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 10" × 7", pp. 2791, with illustrations. Price: £21 3s. 6d.

The first edition was stated to be written for the clinician, the laboratory worker, and the medical student; this was in 1935. This is the fifth edition.

"Complications of Regional Anesthesia: Etiology—Signs and Symptoms—Treatment", by Daniel C. Moore, M.D.; 1955. Oxford: Blackwell Scientific Publications. 10¼" × 7¼", pp. 307, with illustrations. Price: 75s.

Deals with: (*a*) the complications of local infiltration and peripheral nerve block, (*b*) the complications of spinal (subarachnoid) and epidural (peridural) block, and (*c*) incidental complications.

"Urological Surgery", by Austin Ingram Dodson, M.D., F.A.C.S.; Third Edition; 1956. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 9¾" × 7", pp. 868, with many illustrations. Price: £11.

No effort has been made to include all worthwhile surgical procedures, but one or more procedure is described for each surgical problem.

"Breast Feeding: A Guide to the Natural Feeding of Infants", by F. Charlotte Naish, M.A., M.D.; Second Edition; 1956. London: Lloyd-Luke (Medical Books), Limited. 5" × 7½", pp. 175, with illustrations. Price: 12s. 6d.

The first edition won the "Sir Charles Hastings Clinical Essay Prize" of the British Medical Association.

"Clinical Urology for General Practice", by Justin J. Cordonnier, M.D., F.A.C.S.; 1956. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 9¾" × 6¾", pp. 252, with illustrations. Price: £3 14s. 3d.

The book is based on material presented to senior students in Washington University.

The Medical Journal of Australia

SATURDAY, JULY 28, 1956.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE AUSTRALIAN HOSPITAL ASSOCIATION.

THE Australian Hospital Association was formed nearly ten years ago and comprised the teaching hospitals of New South Wales and Victoria. Its activities have been expanded to cover all hospitals in Australia, and it has issued the first number of its official journal, *National Hospital*, a well-printed and put together production. The width of the field to be covered by it may be gathered by the fact that there are in Australia (according to a brochure accompanying the journal) 864 public and governmental hospitals and 609 private hospitals. These have 63,417 beds and employ 47,562 professional and "para-professional", and 49,471 lay staff members. Put in a few words, the aims and objects of the association are "to serve all mankind by constantly searching for new and better ways to improve patient care, to train health personnel and to protect community health". The aims and objects are set out in the "Articles of the Constitution" in the following terms:

(a) To promote the nation's welfare by developing a better standard of hospital care and community service.
(b) To promote the well-being and protect the interests of the public and voluntary hospitals within the Commonwealth of Australia.
(c) To foster a spirit of co-operation between the governments, both Federal and State, and the public and voluntary hospitals of Australia, and to seek representation at any conferences convened by such government or governments to discuss problems which concern hospitals.
(d) To improve the educational of technical personnel and raise the working standards of hospital workers both professional and lay.
(e) To promote conferences so far as to introduce uniform methods of administration, standardised building and equipment, etc.
(f) To promote uniform methods of presenting their vital statistics.
(g) To assist each other in the matter of providing interchange of specialised services not available in all hospitals and the extension of rural-urban hospital co-ordination.
(h) In furtherance of the objects of the Association to affiliate with and enter into arrangements for reciprocity with other approved organisations of a similar character.
(i) To do all such other lawful things as are incidental or conducive to the attainment of the above-mentioned objects or any of them.
(j) The organisation and promotion of workshops, schools and institutions in any branch or field of hospital work.
(k) The publication of journals appertaining to the work of hospitals and allied services for the promotion of information, education and goodwill in any field of hospital service.
(l) The establishment of an information bureau on all matters concerned with hospital work and practice.
(m) The establishment of Standards for Hospital Equipment and Plant.

Here we have a set of aims and objects which are commendably comprehensive; few, if any, hospital activities have been omitted.

Some of the activities of the original Australian Hospital Association have been reviewed in the new journal in an editorial by Sir Herbert Schlink (having a concluding reproduction of his signature and being, regrettably, topped by his picture). The association persuaded the Carnegie Trust to send "the American ace" of Hospital Records Librarians, Mrs. Edna Huffman, to instruct Australia in the modern and economic method of keeping and storing medical records. As a result of this visit the affiliated Australian Records Librarians Association has been formed; it is now holding schools of instruction and gives diplomas to local students. The association persuaded the Federal Government and the Victorian and New South Wales Governments to invite the late Professor Malcolm MacEachern to report on clinical educational programmes in the teaching hospitals of Australia. It organized a deputation, accompanied by Professor MacEachern and representatives of the universities, to wait on the Prime Minister to urge a special allocation of funds for clinical teaching. We are not informed what the outcome of that deputation was. The association was also instrumental in bringing to Australia many experts in hospital matters; among these was Professor R. Stull, of the University of California. The association has been interested in the teaching of hospital administration. As readers of this journal know, there are two schools of thought about hospital administrators. According to one school the chief administrator should be a medical graduate who has undertaken special study to fit him for the work; this is the idea that has been generally advocated by this journal. The other school would have as administrator a non-medical man, of what is called the secretary type. Of course neither a medical man nor a secretary is able without further study to become a capable hospital administrator. The Australian Hospital Association has been instrumental in prevailing on the New South Wales University of Technology to inaugurate a degree course in hospital administration. This was made possible by a grant of £55,700 from the Kellogg Foundation. The Foundation, we are told, is sending to Australia Dr. Hartman, who will give advice on the arrangement of the curriculum and other details of organization.

So far a great deal has been done. The establishment of this new hospital journal is as it were the coping stone on the new edifice. An editorial committee has been appointed. The chairman is Dr. Edgar Thomson; the

members are Sir Herbert Schlink, Dr. John Fulton, Dr. Hal Selle and the Reverend N. M. McNally; the Executive Editor is Dr. S. B. Hatfield, who, incidentally, holds a degree in hospital administration. The journal will be issued each month and the subscription rate is £2 2s. *per annum*. The movers in this matter are looking for wide support from members of the medical profession and it is to be hoped that they will receive it.

The contents of the first issue are divided into several categories. First come a series of articles on administration; these will be of interest to medical readers. The article by W. Harcourt Reid on education in hospital administration is worth reading, as also is "Trouble Shooting is Second Nature" by T. A. C. Griffith. There is a section on catering and dietary, and there is also one on engineering and maintenance in which sterilization and the hospital engineer are discussed by E. H. Whitehead Davies. The "Hospital for the Month" is the Royal Perth Hospital, and the article is by John Griffith, who gives some historical details. This will appeal to the historically minded members of the medical profession. There are four "medical" articles. Rodney J. Meyers writes with conviction on resettlement of the disabled. Richard Johnson discusses television and medicine. Hilary Roche, as one would expect, writes convincingly on the battle in the control of tuberculosis. His title is mutilated in the table of contents to "Nation Forefronts T.B. Battle". This kind of thing will not find favour among serious students of medicine. B. L. Sinclair-Smith writes hopefully of what may be called a brave new world in cardiology in which "new hearts will be made from old, new tissues will replace the worn out and probably total heart replacement may be possible". All the same he gives a good idea of progress made in cardiology in a quarter of a century. The table of contents concludes with a section on pharmacy and one of "special features" which include a tribute to the late Malcolm T. MacEachern.

The welfare of the Australian Hospital Association is largely in the hands of the members of the medical profession. Hospitals are essential to doctors in their work. Doctors should therefore do what they can to further the interests of the body that sets out to bind hospitals together and to promote their efficiency.

Current Comment.

CANCER DIAGNOSIS BY BONE MARROW SMEARS.

TEN years ago K. Rohr and R. Hegglin[1] described a method for the diagnosis of cancer by a study of smears of bone marrow. C. H. Jaimet and H. E. Amy,[2] of Hamilton, Canada, have been using the method since 1936 to diagnose cancer, and they report on their findings from a study of over 4000 patients.

Small aspirates of bone marrow are taken from the sternum and slides are made in a particular way or preferably marrow particle imprints are obtained. It is evident that success in using the method depends upon a thorough knowledge of the technique described and on a prior study of a smear from a number of cases of known cancer and a number of cases which are almost certainly noncancerous. Tumour cells found in marrow aspirates are unlike normal hæmopoietic cells and also abnormal hæmopoietic cells found in certain conditions. The tumour cells differ in appearance according to the nature of the cancer from which they were derived, but they all show a tendency to form cell balls or metastatic clumps. Often one can suspect the site of origin of the cancer cells. When single carcinoma-like cells are found in marrow smears they must be considered doubtful. It is not possible here to give an account of all the cytological changes noted in the marrow smears. Of 4100 bone marrow aspirates 55·3% were diagnosed as positive and few, if any, of these were false positives. In the few cases in which the aspirates were positive and clinical manifestations of the presence of cancer were lacking, sufficient time has not yet elapsed for the diagnosis to be certain. In what percentage of proved cancers a "negative" marrow is present is not yet clear, although it is the impression of the authors that in few such cases are metastases present. The authors ask by what means the body holds in check or kills the cancer cells seen in the circulation of the bone marrow. Although most of the specimens were taken from the sternum, a macroscopic secondary carcinoma growing in this bone is rarely seen. Surely, therefore, in carcinoma malignant cells often circulate through the body and yet, since masses of these cells are found in sternal aspirates, the body must have some defence mechanism against them. Finally the authors claim that their evidence shows that the procedure of bone marrow examination gives evidence of cancer in a large number of patients in whom diagnosis by all other known means was heretofore not possible.

"One must caution physicians and technicians alike that the value of this test varies directly with the technic of obtaining marrow (small amount, undiluted) and method of smearing and staining particles or concentrates from the fluid aspirate."

[1] *Deutsches Archiv. klin. Med.*, 1936, 179: 61.
[2] *Ann. Int. Med.*, April, 1956.

KELOIDS TREATED BY HYDROCORTISONE.

WHILE rapid healing of skin damage is an advantage, over-healing produces a keloid which is an unsightly mass of scar tissue, the result of fibroblastic proliferation, and the normal subsequent contraction in the scar may result in severe disability especially if the affected area is large and is in a joint region. A fresh keloid scar consists of dense bundles of collagenous fibrils with a profuse mucinous ground substance containing a high proportion of mucopolysaccharides. The predisposition to keloid scarring is probably an inherent characteristic. Keloid scarring may be found after any skin injury, but its most severe effects are seen after widespread burns in childhood. Occasionally, secondary malignant changes occur in keloid scarring. Treatment is designed to soften and to stretch the scar. By radiotherapy the scar mass may be reduced, and such treatment by X radiation has proved very useful for localized lesions of this nature. It was known that patients with Cushing's syndrome tend to develop the distensions of scar tissue, and the well-known effect of corticotrophin in reducing fibroplasia stimulated research into the use of this substance in the treatment of keloid scars. H. Conway and R. B. Stark[1] have reported favourably on the injection of the keloids with corticotrophin to which the spreading factor hyaluronidase had been added. The improvement noted was one of symptoms rather than of signs. In a large series improvement in the tumour mass itself by the use of topical injections of hydrocortisone acetate is reported by G. Asboe-Hansen, H. Brodthagen and L. Zachariae.[2] In all, 56 keloids were treated in 40 patients. The scars were the result of vaccination, burns, acne, operations and contusions. Each was sufficiently small in size to be treated by one or two injections into their mass. The dosage of hydrocortisone acetate was 35 to 725 milligrammes per treatment in a solution containing 25 milligrammes of hydrocortisone acetate per millilitre. The individual dosage varied with

[1] *Arch. Surg.*, January, 1952.
[2] *Arch. Dermatol.*, February, 1956.

the size of the keloid. The scars were of varying ages from six weeks to eight years. The solution was injected into the keloid either directly through it or by approach from the deep subcutaneous tissue. Injections were given at eight-day to twenty-day intervals. Of the 56 keloids thus treated, 51 were softened and flattened, 41 of them to normal skin level. In 32 of these cases the keloid disappeared. In five cases no improvement occurred after two months of treatment, although irritation was cured. Among the initially successful cases only one recurrence has since taken place. Side effects consisted of occasionally non-fibrous atrophic skin or of slight atrophy in the normal skin adjacent to the scar. Into one post-appendicectomy keloid scar hæmorrhage, necrosis, and ventral herniation occurred.

Microscopic evidence lends view to the concept that the effect of hydrocortisone is upon the ground substance between the fibrils which thus lose their adherence. It was also evident that fresh keloids responded most rapidly and that the optimum time for injections was at the seven-day to twelve-day intervals. The use of hydrocortisone in the treatment of the most troublesome large keloid scars has not so far been reported. However, it would appear from this present information that, used sparingly, hydrocortisone is a potent, and maybe a preferable, method to radiotherapy and plastic surgery in the treatment of small keloid scars.

HYPOPHYSECTOMY IN CANCER OF THE BREAST.

THE techniques of removing the sources of hormone in an attempt to reduce the activity of neoplastic disease are in the early stages, so that a critical evaluation of the various procedures is still not easy. In particular, the malignant diseases which are most influenced by upsetting the hormonal environment are those arising from tissue which is itself in the normal state influenced by hormonal control. Thus it has appeared that either hormonal addition or hormonal withdrawal may slow, or even arrest, the primary and secondary carcinomata of the male and female reproductive systems. In the particular case of carcinoma of the breast, numerous methods of interfering with the related hormones have been introduced and various hopeful reports have been made. The treatment has been designed, not as a cure, but as a form of palliation. Treatment may consist of the administration of œstrogen hormone antagonists, by removal of the ovaries or of the adrenals, and more recently by the removal of the *hypophysis cerebri*. From the neurosurgical department of the Copenhagen University Hospital has come a report by A. Andersson[1] on the use of hypophysectomy in the treatment of patients with advanced cancer of the breast. Twenty patients were so treated and each was submitted to operation only when all previous therapy had failed, including surgical procedures, radiotherapy and hormone therapy. The malignant neoplasm had been diagnosed from one to fourteen years previously. Both before and immediately after the hypophysectomy each patient received 200 milligrammes of cortisone by intramuscular injection. Cortisone was given in reducing dosages by this method until the fifth day, after which it was given in a dosage of 25 milligrammes by mouth twice a day. In some cases, symptoms of adrenal insufficiency still occurred, though the condition was rapidly changed by the administration into a vein of hydrocortisone in glucose solution. In nine of the twenty women the results of the operation are described as "good". In each of these patients pain had completely vanished and the growth of metastases was retarded. It was found that in two of the patients, retrogression of secondary growths in the skin began after operation. Each of the patients who gained a remission was enabled to lead a relatively normal life without the use of analgesics, and two of them were completely fit for work. In the nine patients with a remission, the weight increased and blood tests began to give normal results. Andersson suggests that in the patients who did not obtain a remission the failure was probably due either to the initial poorness of the patient's condition or to the insufficiency of the hypophysectomy. On all the patients, tests were made of the extent of the hypophysectomy by means of the adrenal test, which is related to pituitary function, and by means of the ACTH test, which is related to the function of the adrenal gland. The estimation of 17-ketosteroid excretion was also used as an expression of adrenal function, and the I^{131} uptake was used to estimate the function of the thyroid gland. Five patients who showed biochemical incomplete fall in pituitary activity were at autopsy found to have had only a partial hypophysectomy. The value of these tests in estimating the degree of success of the operation is thus confirmed. After three months the surviving patients were found to be mentally normal and of normal appearance. The only abnormality of note was atrophy of the breasts and salivary glands. The maintenance dose of cortisone was decreased if diuresis became troublesome. In assessing the final results of hypophysectomy it is to be noted that of the fifteen in whom the procedure was complete, nine patients obtained a remission of symptoms. Andersson suggests that hypophysectomy is least likely to be successful in patients with metastases in the liver and brain. The neurosurgical procedure is a relatively minor one, and results have shown that a normal life can be led without difficulty after removal of the pituitary gland. Hypophysectomy may have the particular advantage over adrenalectomy in that the former procedure ensures the cessation of somatotropin, a hormone which is essential for the growth of secondary metastases in bones. The series of cases is small, and Andersson wisely makes no attempt to evaluate the effect of the removal of the pituitary on the prolongation of life. Though the value of hypophysectomy is demonstrated, it can hardly be termed a minor procedure, nor is it a procedure applicable in general surgical practice. The failure of the operation because of inability to remove all the pituitary must be particularly disappointing. As the failure is quickly recognized by the biochemical tests for pituitary, thyroid and adrenal function, it may well be considered that adrenalectomy holds the last hopeful straw for these patients.

[1] *Danish M. Bull.*, March, 1956.

BURNS AND POLYETHYLENE GLYCOL OINTMENT.

THE treatment of burns has changed considerably in the last few years. Aided by the security against infection afforded by the antibiotics, treatment has become far more conservative. It is now recognized that local treatment may hinder rather than accelerate healing and should be applied only for the necessary prevention of deformity, for the prevention of infection and for the comfort of the patient. The simple exposure of burns to the air and the correction of fluid and electrolyte balances have done much to reduce the discomfort of repeated dressings with the tearing of delicate healing tissue. However, exposure may sometimes be modified usefully by the application of a temporary substitute for the lost skin without the actual application of material dressings. The criteria of usefulness for such a substance are numerous, and so far none of the substances produced has satisfied many of the requirements. The use of non-toxic water-soluble or water-miscible ointments has proved encouraging and various additions have been advocated including wetting agents, pyruvic acid and antibiotics. C. A. MacGregor and R. R. Pfister[1] have used an ointment of which polyethylene glycol compounds have been the main constituents. The ointment is liberally applied to the burns without further dressing. It contains, in addition to the base antibiotics, fungicides and a "debriding" agent. No refrigeration is needed in storage and reapplication is made as often as may be necessary. The eschar is soft, pliable and almost transparent and epithelium grows in and *débridement* is easy. When grafting is indicated, preliminary soaking in

[1] *Surgery*, April, 1956.

1 in 1000 "Zephiran" in Ringer's lactate solution produces *débridement* with surprisingly little trauma and minimal discomfort. The authors have used the polyethylene glycol ointment in the treatment of 24 severely burned patients for whom skin grafting was indicated. Half of the patients were children and half required intravenous therapy. In most of the cases well over half the *débridement* was accomplished at the bedside without the use of anæsthesia. The skin grafting was satisfactory in most of the cases, and in only four was the procedure delayed by failure of the eschar to separate in over twenty days. In five patients, recovery was influenced by infection of the burns, although in the majority no infection was detectable, despite the absence of a strict aseptic technique. Five patients in the series died, none of the deaths being due to the ointment. Frequent changes of dressings requiring operative conditions and risk were unnecessary, the course of recovery was benign and without evidence of toxicity, and ambulation was early. From their experience MacGregor and Pfister suggest that the further use of this kind of water-soluble ointment is warranted. Such relatively simple and effective modes of treatment are of particular importance at the present time when the chief treatable hazard of international conflict is that of thermal burns.

SKIN DIVING AND RESPIRATORY FUNCTION.

CONSIDERABLE experience is needed before the skin diver can safely be allowed to dive alone and explore the new world afforded by the light, portable apparatus for providing an independent supply of oxygen. The hazards of skin diving are many, and the sport is not one to be taken lightly by the inexperienced or foolhardy. The training of the wartime frogmen was arduous, and much valuable information must have been gathered by hard experience. In adapting himself to the new underwater world, the skin diver has to learn to face new psychological situations and to adopt new reflexes. How far the human physiology may become adapted to the new environment and how far the process is one of simply avoiding unfavourable conditions are not clear. Past attention has been paid rather to avoiding the dangers by developing the reflexes, but modern experiment has tended to show that the experienced diver is not only safe because of his knowledge and skill, but also because of the physiological adaptations of which he is presently capable. K. W. Donald and W. M. Davidson[1] found that divers while sitting or standing under water appeared to have remarkably low levels of oxygen uptake, though the increase in oxygen needs of "finned" divers was commensurate with other athletic activities when they were moving about. The oxygen uptake of surface swimmers performing a moderately rapid breast stroke was approximately two litres per minute, while the oxygen uptake of half the underwater swimmers was rather higher and exceeded three litres per minute at faster speeds.

One of the dangers of underwater swimming with the use of a breathing apparatus is that of oxygen toxicity. K. E. Schaefer[2] has attempted to find some sign which would warn the swimmer that he is becoming toxic owing to the oxygen. The subjects employed were 12 experienced underwater swimmers swimming at depths of from 20 to 40 feet under water at an average speed of 0·85 knot. Oxygen breathing was employed for a period of ninety-three minutes, and the swimmers rested every fifteen minutes. It was found that at each depth there was a systematic downward trend in the pulse rate at the beginning of the rest period, and that after about half an hour the pulse rate was greater at the lower depths. Also towards the end of the period of swimming, increased activity failed to bring about the usual increase in the pulse rate. The respiratory rate in contrast tended to rise during the constant activity, but was not affected by differences in the depth of water. It appeared from individual analyses that reduced responsiveness of the pulse rate during recovery periods preceded the development of the symptoms of oxygen intoxication. The loss of pulse responsiveness was followed when swimming was continued, by exhilaration and finally by unconsciousness lasting for about ten minutes. One subject had to be removed from the water and developed a typical grand-mal seizure with final complete recovery. Oxygen consumption was not found to increase with the depths of water up to 20 feet, though it increased very slightly at greater depths. The commonest sign of oxygen intoxication was dyspnœa, though many subjects also experienced nausea, twitching, numbness, irritability, convulsions and visual disturbances. Dyspnœa appeared to be related to shallow respiration. When swimming was terminated by toxicity of oxygen there appeared to be a concurrent, increased sympathetic activity, though the fixation of pulse rate which preceded symptoms was considered to be parasympathetic in origin. It is considered by Schaefer that this non-responsiveness of the pulse could be used as a warning of oxygen toxicity.

The effect of skin diving on lung volume has been further studied by C. R. Carey, K. E. Schaefer and H. J. Alvis.[1] The inquiry was prompted by the observation that instructors in an underwater escape establishment appeared to acquire increased ability to hold their breath. The instructors regularly made ascents from air locks at a depth of 100 feet, so that the air in their lungs might be expected to expand four times during the ascent. Measurements of vital capacity of instructors and controls revealed a higher capacity in the instructors. Likewise, the latter had higher capacities than predicted by use of the West formula based on body surface area. In fact, the lung volumes of the instructors were also increased. Study of new instructors showed that during the first year the pulmonary volume increased together with vital capacity, tidal volume and inspiratory reserve, though the residual volume decreased. The increases were all statistically significant. The same changes were reflected in similar measurements made while the subject was actually in the water. The study revealed that the increased capacities of habitual skin divers were not merely due to natural selection, but also appreciably to adaptation. Skin diving increases the inspiratory load on the pulmonary cycle, and it was in this direction that the adaptation occurred. With increase in the total pulmonary capacity the diver can reach greater depth. There are other sides to the adaptations of skin dives such as increased carbon dioxide tolerance. No doubt much knowledge will be forthcoming on the interesting subject of skin diving. Medicine is never far from man as he conquers new conditions, and it is right that safety and wisdom should make safer the amphibious explorations of man as he joins the world of fishes below the surface of the seas.

[1] *J. Appl. Physiol.*, July, 1954.
[2] *J. Appl. Physiol.*, March, 1956.

CANCER REGISTRATION.

A SUMMARY of cancer registration practices throughout the world has been published by the World Health Organization,[3] after a meeting held at Copenhagen in June, 1955. It is pointed out that studies on mortality statistics have shown that there are considerable differences in the relative importance of the cancers of various sites between countries and even between different regions in the same country. More precise information is likely to be obtained from cancer registration; so that it is important to ensure comparability between countries.

The Danish Cancer Registry was opened in 1942 by the Danish Anti-Cancer League supported by the National Health Service and the Danish Medical Association. In France an "*Enquête permanente*" was established in 1943. Registration in England and Wales has been in operation since 1945. Other countries, such as Norway in 1952,

[1] *J. Appl. Physiol.*, March, 1956.
[3] World Health Organization. Expert Committee on Health Statistics. Subcommittee on the Registration of Cases of Cancer. April 13, 1956.

Finland and Belgium in 1953, and Iceland and the Netherlands in 1954, have begun registration of cancer cases. Belgium as yet is dealing only with cancer of the lung. In Italy, it is proposed to have a complete cover of certain chosen areas.

The Registrar-General of England and Wales[1] gives a more detailed account of registration. In England and Wales, cancer registration was begun in 1930 by the Radium Commission, which required therapeutic centres to supply information on patients treated and to report on their subsequent condition. In 1939 a *Cancer Act* required each county or county borough in England and Wales to make arrangements for the treatment of cancer and to keep records of the progress of the patients. It was not possible to carry the provisions of the Act through until the termination of the war. The local centres in England now forward an abstract card to the General Register Office, which has agreed to process them. After summarizing the information on cancer incidence the General Register Office returns the card to the local centres which follow the patient up year by year. Thus five-year and fifteen-year survival rate studies are in progress for different modes of treatment. In the Supplement,[1] special attention is paid to cancers of certain sites, namely, breast, *cervix uteri*, rectum and skin. It is noted that over 20% of women diagnosed as suffering from early primary cancer of the breasts delayed more than twelve months before seeking medical advice. Survival rates are given for patients with early and late primary lesions and for those with secondary nodes in the axilla. The results of surgical treatment, surgery and radiation and radiation therapy alone are compared. It is evident that the registry is collecting and reporting data of great interest and importance.

Of the States in Australia, only Victoria has a registry which embraces the bulk of the patients entering the hospitals of the State. The work of the registry was suspended during the war. An excellent system of cooperation with the hospitals and other bodies has been devised, and already reports and papers of interest have been prepared by the staff and help has been given to clinicians interested in the study of cancer. Along such lines we can expect clinical knowledge of the cancers to increase. The duty of all the States in this matter is obvious.

MASKS AND AIR-BORNE INFECTION.

THE values of various different types of mask have provoked much comment. No mask has yet been devised which is not at times irritatingly uncomfortable to the wearer; the type of mask and the way in which it is worn vary with place and personality. Masks are most commonly worn by medical personnel to protect the patient from potential air-borne infection. However, less familiarly masks may also be employed in the protection of the wearer from the environment. Difficulty arises from the fact that a mask which effectively stops most of the micro-organisms also restricts respiration, so that breathing either is uncomfortably laboured or takes place around the edges of the mask. S. Abramson[2] has carried out investigations of the usefulness of various types of mask in the prevention of infection in rabbits by bovine tubercle bacilli. The rabbits fitted with masks were exposed to an aerosol suspension of the bacteria under standardized conditions. Three groups of experiments were carried out by this method of simultaneous exposure to infected air. In the first were three rabbits wearing gauze face masks and three without; in the second, two rabbits wore gauze face masks, two rabbits wore respirators with felt filters and two were without either; in the third group two rabbits wore respirators with felt filters, two wore respirators with gauze filters, and two were without either. The hair was clipped from the face to eliminate air filtration. The lungs of animals which died after the experiment, together with those of an appropriate number of controls, were examined for tubercle bacilli by culture. Otherwise the animals were sacrificed after the incubation period and when the control animals developed a strong tuberculin reaction. Careful counts were made upon each lung of the total number of gross primary tubercles. On an average, the protection given by the gauze mask in the first group of experiments was 67·1% and in six similar experiments the protection was the same. In the second group of experiments the protection given by the gauze mask was 84·9% and that given by the respirator with felt filter was 96·1%. In the third group, the protection given by the felt filter respirator was 99·1%, while no significant protection was given by the respirator with gauze filter. In summation, the gauze face mask resulted in a 77% reduction in the tuberculous infection, the respirator with felt filter gave almost complete protection, and the respirator with gauze filter gave almost no protection. Despite the very heavy infective exposure of these rabbits, Abramson is cautious in referring these methods directly to human infection. However, the findings to him are strongly suggestive, though it is emphasized that the masks fitted well and acted as a filter and not merely as a deflector, as so frequently happens in practice. No clear experimental proof of the effect of moisture on the efficiency of the filter is available. The failure of the gauze in the respirators may, in Abramson's view, have been due to the decreased respiration frequency as compared with that noted when the felt filter was used. The felt filter which slightly obstructed breathing resulted in increased respiration frequency and in a reduction of the holding time of any infective particles which had reached the lungs. As a simple mask the gauze had a greater filtration area than that in the respirators, so that the mask was less likely to slip on the face. No detectable impairment of the efficiency of the gauze face masks occurred as the result of repeated laundering.

[1] "The Registrar-General's Statistical Review of England and Wales for the Two Years 1950-1951", Supplement on General Morbidity, Cancer and Mental Health.

[2] *Am. Rev. Tuberc.*, March, 1956.

CECIL ERNEST EDDY.

THE world of science was shocked to learn of the sudden death of Dr. Cecil Ernest Eddy, which occurred recently at Perth, Western Australia. He was a physicist of the first rank and served the Commonwealth of Australia over many years in an unassuming and faithful fashion. He did much for medicine through the pages of this journal and in other ways, and it is fitting to pay tribute to his memory. Such men as he are hard to replace, and he died at a comparatively early age; the date of his birth was June 21, 1900. Science claimed his attention at the start—he received the degree of Bachelor of Science at the University of Melbourne in 1922 and that of Master in 1923. In 1930 he obtained his Doctorate. He became Senior Lecturer in Physics at the University of Melbourne and joined the Commonwealth X-Ray and Radium Laboratory, Melbourne, as physicist-in-charge in 1935, and was apointed director in 1949. At the time of his death Eddy was chairman of the X-Ray and Radium Committee, of the Radioactive Isotopes Committee and of the Radio Therapy Advisory Committee, and he was also a member of the Industrial Hygiene Committee set up by the National Health and Medical Research Council. Eddy was an international figure. Early this year he attended, as Australia's official representative, the meeting of the United Nations Scientific Committee on Atomic Radiation which was held at New York, and the International Commission on Radiological Protection at Geneva. He was held in such high esteem that he was made chairman of the United Nations Committee on Atomic Radiation. The United States delegation sent a dispatch to Washington praising his chairmanship. The Secretary-General of the United Nations, on hearing of Eddy's death, said:

> Dr. Eddy was not only a great name in modern physics, but also a great man whom we were gratified and proud to have as chairman of the United Nations Committee on Atomic Radiation. Australia can take just pride in him and in his achievements.

Abstracts from Medical Literature.

OBSTETRICS AND GYNÆCOLOGY.

Malignant Tumours of the Ovary.

G. A. GARDINER AND J. SLATE (*Am. J. Obst. & Gynec.*, September, 1955) review 96 proved cases of carcinoma of the ovary and evaluate the therapeutic results in an attempt to determine the advantage, if any, in the use of post-operative irradiation. The authors state that the survival rate for ovarian carcinoma has remained unchanged during the past twenty years owing to the insidious onset of the disease and to the frequent finding of advanced malignancy at the first diagnosis. Patients between fifty and fifty-nine years of age were those most frequently affected in this series. Of the patients 23% were nulliparous. The outstanding symptoms, and often the only ones, were gradual swelling of the abdomen and abdominal pain. Symptoms due to the effects of pressure on the gastro-intestinal and genito-urinary tracts were next in order of frequency. The authors observed that patients with symptoms of six months' duration or longer had a better prognosis than those with shorter symptoms. They consider that the metastatic rate is higher in patients with symptoms of shorter duration. An abdominal mass was the most common finding on examination (45%); ascites was present in 21% of the patients and usually indicated advanced neoplasm. Serous papillary cystadenocarcinoma was the most common malignant ovarian tumour in the series (54 patients), and solid adeno-carcinoma was the next most frequent (29 patients). The authors consider that the most important factor in prognosis is not the histological type or the grade of malignancy, but the gross stage of the disease at the time of diagnosis. Certain principles of treatment are stressed. Surgery is indicated even for patients suspected of being inoperable. Biopsy of the tumour should always be undertaken, and a primary growth should be removed, even when the disease has spread beyond the ovary. When possible the surgery of choice is bilateral salpingo-oophorectomy with total hysterectomy. In cases of advanced growth, as much of the tumour as possible should be removed, and then X-ray therapy in adequate dosage should be administered. The overall five-year survival rate of the series was 32·3%. In patients treated by surgery alone (64) the survival rate was 22%; in patients treated by surgery and irradiation (32) the survival rate was 53%. The rapid decrease in survival after the tumour has spread beyond the ovary was from 73·7% in stage I cases to 30% in stage II cases. Stage I patients, treated by surgery alone, had a survival rate of 83%, and probably this figure cannot be improved by the addition of radiation therapy. In stage III patients only 17% survived for five years after treatment by surgery alone. The addition of radiation therapy increased the survival rate to 50%. The authors conclude that post-operative irradiation, given in adequate dosage, definitely increases the survival rate of patients in whom all the tumour cannot be removed by surgery.

Hyaline Membranes in the Lungs of Premature Infants.

W. S. ROGERS AND P. G. GRUENWALD (*Am. J. Obst. & Gynec.*, January, 1956) present a study of the autopsy findings and histories of 56 newborn infants in whose lungs hyaline membranes were present. The incidence of ante-partum hæmorrhage was significantly higher in this group. Only five of the infants were described as being in good condition at birth, 26 had a delayed onset of respiration, and cyanosis and retraction of the thoracic cage was noted in 42. The majority of the infants lived between eight and sixteen hours and none died before the third hour. In general, the larger the infant the longer the duration of life. Œdema fluid, rather than aspirated vernix, appears to be the most likely cause of the membrane, which is associated characteristically in premature infants with a peculiar type of atelectasis, which may also occur without the presence of membrane but with the same grave consequences. The authors suggest that hypoxia, shock, vascular injury and pulmonary œdema are probably important factors contributing to the death of these infants.

Rupture of the Pregnant Uterus.

T. F. BAK AND G. E. HAYDEN (*Am. J. Obst. & Gynec.*, November, 1955) report a study of 52 cases of rupture of the pregnant uterus in patients treated at the Chicago Lying-in Hospital during the period from the year 1931 to 1953. The incidence of this complication was 0·07%, the associated maternal mortality was 15%, and the uncorrected fœtal mortality was 50%. Of the 37 ruptures which were non-Cæsarean in type, 31 were of traumatic origin and six were spontaneous. Fifteen cases followed Cæsarean section and included only one instance of traumatic rupture. The authors consider that these figures serve to emphasize the importance of the unknown integrity of the surgical scar. The six non-Cæsarean, spontaneous, uterine ruptures occurred in multiparous patients during active labour. Three occurred in the lower uterine segment and were incomplete, and three involved both upper and lower uterine segments and were complete. In this group there was one maternal death and four infants died. Among the 31 traumatic ruptures of the uterus, previous gestations and previous instrumentation and manipulation were considered to be predisposing factors. Almost half of the traumatic ruptures followed version and extraction; four were due to oxytocic drugs given to induce or stimulate labour. All traumatic ruptures involved the lower uterine segment and 22 were incomplete. There were seven maternal deaths among these 31 cases and there was a fœtal mortality of 56%. Six of the 15 post-Cæsarean ruptures were asymptomatic and incomplete and were only recognized when the abdomen was reopened. Among the remaining nine patients in whom true ruptures occurred, all were in labour and had uterine tenderness as the outstanding sign. The classical signs and symptoms of uterine rupture, which are abdominal pain and tenderness, cessation of labour, and shock, were noted only in the patients with spontaneous uterine rupture. Immediate post-partum hæmorrhage and shock were the characteristic signs in 90% of traumatic ruptures. Of the patients with a post-surgical uterine rupture, six gave no evidence of pending or actual rupture. The authors stress the importance of prevention by properly selected obstetrical treatment. When rupture of the uterus is suspected, early diagnosis by manual exploration of the uterine cavity is indicated. Treatment includes the judicious replacement of blood and fluid, the administration of antibiotics, and prompt surgical treatment. In most instances, subtotal hysterectomy was the operation of choice. The authors consider that every patient who has had a Cæsarean section is a potential candidate for uterine rupture at almost any time in the third trimester. The policy of "once a section always a section" is strongly advised.

The Future of Extraperitoneal Cæsarean Section.

E. W. CARTWRIGHT (*West. J. Surg.*, February, 1956) makes a critical evaluation of extraperitoneal Cæsarean section based on the replies received from a *questionnaire* sent to 476 obstetricians of the American Pacific coast. Many authorities now consider that chemo-antibiotic therapy and other measures have rendered the simpler transperitoneal operation satisfactory in all cases. More than two-thirds of the obstetricians favoured the retention of the technique of extraperitoneal section and stated that it was practised by them for certain indications. The remaining one-third did not consider that the operation was necessary, because equally good results were obtained with the transperitoneal approach combined with chemo-antibiotic cover. Others considered the operation of extraperitoneal Cæsarean section a hazardous and time-consuming procedure. Approximately half of the surgeons who formerly employed this operation have now discarded it. The author states that the mortality rate is much the same for both operations, and large series have been reported without a single death. Morbidity following extraperitoneal Cæsarean section combined with chemo-antibiotic therapy leaves little to be desired according to the author. He considers that there is less abdominal distension and less risk of intra-abdominal adhesions following extraperitoneal section. Minimal peritonitis following transperitoneal section may result in adhesions, intestinal obstruction and other late complications. Moreover, there are certain limits to the efficiency of antibiotic drugs such as sensitization, bacterial resistance, and ineffectiveness in some infections. These limitations of chemotherapy and antibiotic therapy are considered a valid reason for retaining the technique of extraperitoneal Cæsarean section by some obstetricians. The author concludes that extraperitoneal section increases the margin of safety in cases of dystocia with gross infection with certain

complications of pregnancy, and whenever antibiotic therapy is contraindicated or ineffective. He considers that an obstetrician familiar with the technique of this operation should be available in every community.

The Mid-Forceps Operation.

J. KLEIN AND L. L. MALINCONICO (*Am. J. Obst. & Gynec.*, November, 1955) discuss the advantages and disadvantages of the mid-forceps operation and report a preliminary study of 351 cases in which this operation was performed. Despite the overwhelming evidence in favour of the elimination of the mid-forceps operation, large series of cases have been reported with fairly successful results. In the authors' series, 207 patients were *primigravidæ* and 144 were *multiparæ*. The chief indications for operation were arrested rotation in the posterior and transverse positions (72·6%), and prolonged labour (10·5%). Conventional forceps application was performed on 45% of the patients, the Scanzoni manœuvre on 32%, Kielland rotation on 11·6% and manual rotation and forceps on 6%. The Barton forceps and "wandering blade" application were not extensively used in the series reported. There were no maternal deaths, but there were 25·6% of maternal complications, notably sulcus tears, other vaginal lacerations, and lacerations of the cervix. Only eight patients of the total 351 remained in hospital for a period longer than eight days. Combining the results of eight separate reports from the literature with their own observations, the authors conclude that, even in the most skilful hands, the mid-forceps operation exposes the mother to considerable hazard, particularly from cervical and vaginal laceration with attendant hæmorrhage. A follow-up of 73% of patients revealed cervical lacerations in 24% and genital prolapse in 34%. There was only one stillborn baby in the series, and there were two neonatal deaths. The incidence of stillbirth and of neonatal deaths following mid-forceps operation are quoted in the literature at from 0·8% to 9·4%. Among 204 babies followed-up there were only six in whom suspicion could be cast upon the forceps procedure as a possible ætiological factor in any birth injury. The authors conclude that the number of cases reported is too small to be of statistical significance and to permit definite conclusions.

Surgical Induction of Labour.

J. B. BLAIKLEY (*Am. J. Obst. & Gynec.*, February, 1956) assesses surgical induction of labour and reviews the hazards of this procedure from a study of 843 obstetrical patients at Guy's Hospital from the year 1928 to 1952. The incidence of surgical induction of labour was 3·3%. The chief indications were preeclamptic toxæmia (52·8%), disproportion (25·5%) and post-maturity (10·2%). Induction was performed by rupture of the membranes in 59% of the patients, by means of a stomach tube in 21·3% and by the use of an animal bladder in 18·5%. There were seven maternal deaths in the series, four of which were not considered to be attributable to surgical induction. Maternal death following the induction of labour occurred in 3·6 per 1000 patients, compared with an overall maternal mortality of 2·4 per 1000. The incidence of maternal morbidity following induction was 10·8%, as against 4·3% for spontaneous labour. The morbidity rate was found to vary directly with the induction-delivery interval. Antibiotics were seldom used and penicillin was considered to be of little value in prophylaxis. The author is hesitant about the use of a drip apparatus containing pitocin for induction in cases of preeclamptic toxæmia, post-maturity and disproportion. There was an incidence of 15·6% stillbirths and neonatal deaths. Stillbirths attributable to induction were estimated at 2·1%. The author considers that prolapse of the cord is the most worrying of all the risks in surgical induction of labour. If the head is above the brim, the incidence of cord prolapse is high. This complication occurred 27 times in the series (3·2%). Thirteen of the babies were born alive and 14 were stillborn. The type of induction did not affect the incidence of prolapse of the cord, but parity was of significance, the rate in *multiparæ* being more than double that in *primigravidæ*. Prolapse of the cord occurred approximately three times more often when the head was not engaged than when engaged. Reviewing the work of Walker and others on post-maturity, the author considers that it is wise to induce labour at the forty-second week in *primigravidæ* with the fœtal head engaged. The advisability of induction in *multiparæ* for post-maturity with the fœtal head above the brim is doubtful because of the increased risk of prolapsed cord. The author considers that surgical induction of labour has no place in the treatment of disproportion of *primigravidæ*, and has almost no place in the treatment of *multiparæ*.

Chlorpromazine in Hyperemesis Gravidarum.

R. E. HALL (*Am. J. Obst. & Gynec.*, February, 1956) reports the results of the treatment with chlorpromazine of 42 patients suffering from *hyperemesis gravidarum*. Eleven of these patients were *primiparæ* and 31 were *multiparæ*. In 37 cases the illness was considered to be markedly severe and in five it was moderately severe. Twenty-nine patients of the series had failed to respond to other methods of treatment prior to chlorpromazine therapy. The dosage regimen is outlined, and results emphasize the importance of commencing the therapy in hospital and varying the correct dose according to the individual patient's response. An average course of the drug comprised an initial dose of 50 milligrammes by the intramuscular route, followed by 25 to 50 milligrammes thrice daily by mouth. After the period of dosage adjustment in hospital, patients were discharged on a maintenance dose which was necessary for an average period of five weeks. A placebo test was given to 14 patients and 12 resumed vomiting within one to two days after substitution of the placebo. Sudden withdrawal of the chlorpromazine precipitated a recurrence of hyperemesis in 14 patients. Thirty of the 42 patients were cured, five were improved and seven were unrelieved. Two of the seven unrelieved patients responded to a second course of chlorpromazine. Most of the patients responded to treatment immediately; results were better in patients treated in hospital from the beginning. The author discusses toxic manifestations of the drug in detail. All but seven of the 42 patients exhibited some degree of toxic reaction, usually somnolence and weakness. No episodes of syncope or severe hypotension were noted. The toxic symptoms were counteracted by reduction of the dosage and the administration of dextroamphetamine sulphate, five milligrammes thrice daily. The author has no reason to believe that chlorpromazine had an adverse effect on any of these pregnancies. Six of the 42 patients developed jaundice, a recognized complication of chlorpromazine therapy. The mechanism of chlorpromazine jaundice is discussed and its pathological basis is considered to be obscure. The role of factors such as dehydration, associated biliary disease and allergy is mentioned in this respect. It is of interest that each of the patients who developed jaundice was among those who had not responded to treatment. The author concludes that *hyperemesis gravidarum* is a psychogenic disease which is triggered by the hormonal changes of pregnancy. The central action of chlorpromazine on the emetic and psychic centres explains its effectiveness in treatment. The main drawback to chlorpromazine treatment is its toxicity.

Female Sex Hormone Therapy in Pregnant Diabetics.

P. WHITE, L. GILLESPIE AND L. SEXTON (*Am. J. Obst. & Gynec.*, January, 1956) discuss their experiences in the care of 1100 pregnant diabetic patients. As good chemical control of diabetes does not guarantee fœtal survival, the authors sought other abnormalities in these patients and found in many of them an imbalance of female sex hormones: low levels of serum œstrogen, low levels of pregnanediol excretion and high levels of chorionic gonadotrophin. This imbalance occurs in abnormal pregnancies in diabetic patients; it predicts or precedes the complications of pregnancy; and it can be corrected by the administration of female sex hormones, with improved fœtal survival. The imbalance is greater as the evidence of maternal vascular disease increases. The total treatment of the patient consists of the following: (i) classification of the risk in each individual pregnancy; (ii) chemical control of the diabetes; (iii) female sex hormone therapy; (iv) prevention and treatment of œdema and hydramnios; (v) early timing of delivery; (vi) special post-natal infant care; (vii) yearly observation of the infants for evidence of diabetes. Patients with demonstrable vascular damage are delivered at the end of the thirty-fifth week, and uncomplicated diabetics, if possible, at the thirty-seventh week. In the authors' experience, female sex hormone therapy, added to the other principles of management, gives greater fœtal salvage, maternal protection against retinopathies, nephropathies and the future development of coronary heart disease and even relief of the diabetic state.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Royal North Shore Hospital of Sydney, St. Leonards, on April 19, 1956. The meeting took the form of a series of clinical demonstrations by members of the honorary medical and surgical staffs of the hospital. Part of this report appeared in the issue of July 21, 1956.

Osteoarthritis: Sclerodactyly.

DR. J. B. DICK-SMITH showed a married woman, who had presented in July, 1955, complaining of pain and deformity of the right hand of two years' duration. She had a previous history of rheumatic fever at the ages of seven years and fifteen years, and she had had twinges of pain in various joints ever since. The symptoms in the right hand had come on after a nervous shock. On examination of the patient, the hand was seen to be held in semi-flexion with shortening of tendinous and fibrous bands. The skin was shiny, but there was very little skin thickening. X-ray examination revealed osteoarthritic changes with subluxations at the carpo-metacarpal joints, and possibly calcinosis or avascular necrosis of the tips of the terminal phalanges on the palmar aspects of the first and fifth digits. X-ray examination of the œsophagus revealed no evidence of calcification. The patient had generalized joint pains, which moved about and were relieved by "Butazolidin" therapy.

Hiatus Sliding Hernia Mimicking Anginal Disease.

DR. T. F. ROSE showed a female patient, aged fifty-eight years. Since 1938 this patient had been suffering from attacks of severe epigastric pain radiating to the left side of the chest and down the inner aspect of the left arm and forearm. She found that she was unable to lie supine, nor could she lie on her left side, as those positions often brought on the pain. Since September, 1955, the patient had had frequent attacks of vomiting. On examination of the patient, the blood pressure and electrocardiographic tracings were always normal. During that time the patient had been on enforced rest and dietary measures to prevent her "angina". However, she consulted another physician, who diagnosed her condition as an œsophageal hiatus hernia, and that finding had been confirmed by the radiologist.

Massive Pneumoperitoneum Presumably due to a Strangulated Sliding Hiatus Hernia.

Dr. Rose's second patient was a woman, aged seventy-two years, who had been admitted to hospital as an "emergency", complaining of severe epigastric pain, nausea and vomiting of twenty-four hours' duration. For three years she had been known to have an hiatus hernia for which she had been receiving medical treatment with benefit. On examination of the patient, she was found to be in pronounced respiratory distress with peripheral cyanosis. The abdomen was enormously distended, and generalized tenderness was present. No bowel sounds were audible. A plain X-ray film of the abdomen revealed distension of the large bowel and stomach, with so much free air in the abdominal cavity that the liver and spleen were clearly outlined. Fully half of the stomach was in the chest, which was otherwise normal.

A provisional diagnosis of a ruptured duodenal ulcer associated with an hiatus hernia was made, and after a short period of resuscitation laparotomy was performed. At operation much gas escaped as the abdomen was opened, but no abnormality was found other than a large hiatus hernia in which the stomach was strangulated, half being in the chest. No evidence was found as to the cause of the free air in the peritoneal cavity. The stomach was freed and the diaphragm was repaired from below. The patient recovered uneventfully, and when last examined some six months later was well.

Hiatus Hernia with Large Simple Gastric Ulcer.

Dr. Rose's next patient was a woman, aged fifty years. Fourteen months prior to her admission to hospital she had begun to suffer from mild attacks of epigastric pain. Four months prior to her admission she had begun to suffer from loss of appetite, palpitation and breathlessness on exertion. Two months prior to her admission those symptoms had become accentuated, and the epigastric pain had become very severe and was associated with vomiting with little relief and with the loss of two stone in weight.

On examination, the patient was very pale and in obvious pain and breathless. Pronounced tenderness was present in the epigastrium. A blood count gave the following information: the hæmoglobin value was 3·4 grammes *per centum* and the erythrocytes numbered 2,100,000 per cubic millimetre. X-ray examination with a barium meal revealed a large irreducible hiatus hernia. An ulcer crater was present high up on the lesser curve of the stomach. Occult blood was present in the fæces. After transfusions of packed red cells, the patient was subjected to operation. Thoracotomy was performed on the left side, and a partial gastrectomy with splenectomy and repair of the sliding hiatus hernia was performed. The ulcer was a large, simple ulcer high on the lesser curve penetrating the liver. It was present on the part of the stomach just below the herniated portion. Convalescence was uneventful save for mild collapse of the base of the left lung, which was treated successfully by breathing exercises and coughing exercises. After operation the patient's hæmoglobin value was 12·9 grammes *per centum*. She remained well for five months, when she developed some pain and vomiting, which subsided with the taking of a fluid diet and small meals for some days. Three months later still she was well.

Lymphangiosarcoma of the Right Arm.

DR. E. F. LANGLEY showed a married woman, aged seventy-two years, who in 1946 had had carcinoma of the right breast diagnosed. Radical mastectomy was performed. This was followed by radiotherapy to the involved area. A radiation reaction had occurred over the skin on the site of the mastectomy, and also fibrosis of the upper lobe of the right lung. In July, 1955, a small red papule appeared on the right arm. The lump enlarged to a reddish-purple lump about 1·5 by 1·5 inches in area, on the radial side of the upper part of the right arm. Since the mastectomy the right arm had become enlarged, brawny and œdematous. On January 22, 1956, the patient was admitted to hospital. Biopsy of the lump showed it to be a lymphangiosarcoma. The tumour was excised locally and a split skin graft was applied. Pathological examination of the tissue showed that the tumour was a lymphangiosarcoma, occurring in a post-mastectomy lymphœdematous arm. X-ray examination of the bones revealed no evidence of metastases. The patient was discharged from hospital on March 6.

Myxofibrosarcoma of the Left Thigh and Osteoarthritis of the Left Knee.

DR. V. H. CUMBERLAND showed a male patient, aged sixty-seven years, who said that twelve months previously he had knocked his left thigh and developed a hæmatoma. He had noticed increasing swelling in that site during the period. The swelling had been subject to repeated small injuries, but he had not consulted his doctor until approximately one week prior to his admission to hospital some twelve months after his original injury. Examination of the patient disclosed a large tumour approximately 10 centimetres in diameter situated just below the anterior superior iliac spine and overlying the greater trochanter. There were several areas in which the skin was slightly infiltrated, and it appeared to be attached to the underlying fascia on the surface of the glutei and *tensor fasciæ latæ* muscles.

At operation the tumour and overlying skin were widely excised, the block including the inguinal lymph nodes, the *gluteus minimus*, the *gluteus medius* and the *tensor fasciæ latæ*. The defect was closed with a large abdominal skin flap. Later the donor site was grafted and healing progressed satisfactorily. On the patient's discharge from hospital there was a small area approximately one inch in diameter which was healing well, and he was able to walk with the assistance of sticks. It was expected that he would be unable to return to his normal occupation for at least two months, and the prognosis as to his eventual recovery was doubtful. Pathological examination showed the tumour to be a myxofibrosarcoma.

Dislocation of the Left Sterno-Clavicular Joint.

DR. N. A. FOWLER showed a male patient who had been admitted to hospital after a motor-car accident. Examination of the patient at that time revealed multiple abrasions and lacerations, together with fractures of ribs, signs of head injury and a deformity of the left sterno-clavicular joint. Clinical examination showed the injury to the sterno-clavicular joint to be a dislocation, and this was confirmed radiologically. Despite adequate treatment the left sterno-clavicular joint had remained dislocated. Dr. Fowler said that the patient was presented to show the comparative lack of any disability resulting from the dislocation, and the range of movement possible despite the dislocation.

Pulmonary Infarction.

DR. COTTER HARVEY showed a male patient, aged sixty-eight years, who smoked four ounces of tobacco per week. He had worked in a brickworks for thirty years and admitted to having had a cigarette cough for fifteen years. His previous health had been excellent except for an attack of diphtheria at the age of eight years. Six weeks before being examined on October 27, 1954, he had developed a heavy cold with a cough which had persisted. He had noted blood-stained sputum on several occasions and a pain in the right side of his chest. An X-ray examination of his chest on October 7 had revealed an opaque area in the right subapical region, and that had increased somewhat in extent by October 27. On that date the physical signs were indifinite except for an irregular pulse and some œdema of the ankles, which he had noted intermittently for an indefinite period. The patient was admitted to hospital for further investigation with the provisional diagnosis of bronchial carcinoma. In hospital the following abnormalities were found. His temperature was 101° F. and penicillin therapy was begun. An electrocardiogram revealed auricular flutter with irregular ventricular response. He was treated with (*a*) quinidine and (*b*) "Digoxin", and normal rhythm was established in two weeks. An enlarged right axillary gland was found on biopsy to be merely hyperplastic. A biopsy from the right upper lobe bronchus revealed no abnormality. The Mantoux test produced a negative result. His sputum contained neither tubercle bacilli nor carcinoma cells.

The opaque area seen radiologically slowly cleared, his temperature settled and he was well enough to leave hospital in a month. The diagnosis on his discharge from hospital was pulmonary infarction with pneumonitis. The presence of an obvious cardiac defect in the patient was sufficient reason for delay in a surgical approach. Dr. Harvey said that it was probable that thoracotomy in such a case would have had serious consequences, but the symptoms and radiological signs in a male patient aged sixty-eight years, a fairly heavy smoker, was certainly very suggestive.

Lipoid Pneumonia.

DR. BRUCE WHITE showed a male patient, aged fifty years, who had been admitted to the hospital on July 2, 1954; he had a history of recurrent attacks of pneumonia since October, 1953, with associated cough and sputum and four small episodes of hæmoptysis in April, 1954. X-ray films of the chest from April to June, 1954, revealed an area of consolidation in the right lower zone with only slight improvement. Examination of the patient revealed no abnormality in the respiratory system. There were severe varicose veins in both legs, and varicose eczema of the ankles. The patient was apyrexial. His hæmoglobin value was 14·7 grammes *per centum*, and sputum examination revealed no acid-fast bacilli. Examination of a trapped specimen of sputum revealed "groups" of small, darkly staining cells, which varied slightly in size and had scanty cytoplasm. They were considered to be from an anaplastic carcinoma. An X-ray examination of the chest revealed a wedge-shaped area of consolidation in the right median basal segment.

In view of the foregoing findings, a neoplasm was considered the most likely diagnosis. On July 6, right, middle and lower lobectomy was performed. The post-operative course was complicated by thrombosis of the superficial veins of the right leg, and also by an area of pericarditis and several attacks of paroxysmal auricular fibrillation, all of which were successfully treated, and from which the patient completely recovered. Microscopic examination of the removed segment of lung showed it to be an area of lipoid pneumonia with pronounced fibrosis in some areas. Later interrogation of the patient revealed that for the past eight years he had taken a large dose of paraffin before retiring at night and had always slept on his right side. The patient was discharged from hospital on August 2, 1954, and subsequently sustained a pulmonary infarct, from which he recovered. At the time of the meeting he was well.

Pulmonary Tuberculosis.

DR. A. G. MCMANIS showed a female patient, aged thirty-three years, the mother of two children, who had been admitted to hospital on October 15, 1951, with a history of breathlessness, increasing fatigue, anorexia and pallor of two months' duration. For six months she had had a slight cough, and constant pain in the right upper quadrant of the chest and right shoulder, which radiated into the arm. Enlargement of the joints of the fingers had been present for three weeks, and during the week prior to her admission to hospital she had been sweating at night. She had a past history of thyrotoxicosis three years previously. On examination of the patient, she was pale and had obvious clubbing of the fingers. The pulse rate was 120 per minute. The pulse was regular in time and of good amplitude. The blood pressure was 145 millimetres of mercury, systolic, and 65 millimetres, diastolic, and no abnormality could be detected in the cardio-vascular system. Apart from a hard, enlarged lymph node above the right clavicle, no abnormality was detected in the respiratory system. There was uniform enlargement of the thyroid gland, and the patient's hands were warm and slightly moist. Tremor was present. She had pain in the right shoulder joint on movement, which was not limited in any direction. Her temperature was 101° F. The hæmoglobin value was 8·2 grammes *per centum*; the erythrocytes numbered 3,200,000 per cubic millimetre and the leucocytes numbered 6400 per cubic millimetre. The erythrocyte sedimentation rate was 19 millimetres in one hour. The Mantoux test produced a positive result with 1 in 1000 old tuberculin. X-ray examination of the patient's chest revealed a rounded opaque area in the right lung anteriorly at the level of the first and second ribs. The nature of the opacity was uncertain, but it was considered likely to be a carcinoma. The Casoni test and the Wassermann test produced negative results. No acid-fast bacilli were seen in the deposit or grown on culture of specimens obtained by gastric lavage. A bronchoscopic examination on October 19 revealed no abnormality. On October 31 cervical gland biopsy was performed, and this revealed extensive damage by tuberculosis. On November 23 right anterior thoracoscopy was performed. This revealed extensive disease of the upper lobe of the right lung, but gave no help as to the nature of the lesion. On November 29 right posterior thoracotomy was performed, the third and fourth ribs being removed with a view to right upper lobectomy. It was then thought that the condition was an inoperable carcinoma of the right upper lobe bronchus, which was involving the superior *vena cava* and extending up under the right subclavian artery. The chest was therefore closed. Pyrexia and night sweats, which had been present since the patient's admission to hospital, continued, and a right pleural effusion developed after operation. Acid-fast bacilli were first grown on culture from gastric and tracheo-bronchial lavage specimens on January 15.

The patient was transferred to Queen Victoria Homes, Picton, and a course of streptomycin and PAS was given. Examination of smears from further sputum series gave positive results while the patient was at the Queen Victoria Homes. Antibiotic therapy was recommenced on December 27, 1952, since during a period of leave from the homes the patient had contracted an upper respiratory tract infection. She lost six pounds in weight in six weeks and had a cough, and was recommended to the Royal North Shore Hospital on January 30, 1953. Examination of the patient then revealed signs of consolidation on the right side. Fluoroscopic examination revealed that the right side of the diaphragm was paralysed and that it moved paradoxically. The hæmoglobin value was 12 grammes *per centum*. The leucocytes numbered 4250 per cubic millimetre, and the erythrocyte sedimentation rate was six millimetres in one hour. The patient was discharged from hospital on February 9, 1953, to rest at home and report to the out-patient department at intervals of one month. Dr. McManis said that since then the patient had been having streptomycin, PAS and "Isoniazid", but had refused hospital treatment. During that time she had been attending the out-patient department regularly, and an area of consolidation in the right lung which had gone on to cavitation seemed to be under control.

Pulmonary Tuberculosis Simulating Bronchial Carcinoma.

DR. C. G. BAYLISS showed a man, aged fifty-eight years, who had first been examined on July 12, 1954. He was a grazier by occupation, and was unmarried. He smoked about half a pound of tobacco per week. Two months previously he had consulted a doctor because he had noticed difficulty in taking a deep breath. That had passed off, and he felt well. He had a slight cough, which he had had for years. In 1950 he had had an X-ray examination of his chest. It was possible to obtain that film, which was found to reveal no abnormality. On examination of the patient, he was rather an "old" fifty-eight. However, no abnormal signs were found. His chest was clear and there were no enlarged glands in the neck or in the axillæ. An X-ray film taken on July 7 revealed an opaque area in the left axillary region. The diagnosis seemed to rest between tuberculosis and neoplasm, with the possibility of acute pneumonitis to be considered. On July 14 a bronchoscopic examination was carried out by Dr. Ian Monk. No abnormality was found.

In the absence of sputum, specimens of the fasting stomach contents were taken on July 20, 21 and 22. No tubercle bacilli were grown after eight weeks' incubation. A progress X-ray examination made on September 21 showed no essential change. At that stage acute pneumonitis could be eliminated, and in the absence of finding tubercle bacilli, neoplasm seemed to be becoming more likely as the diagnosis, particularly in view of the fact that the man was a grazier, aged fifty-eight years, who had had clear X-ray findings four years before, and who smoked eight ounces of tobacco per week. A bronchographic examination was made, but no helpful information was found. At that stage the possibility of neoplasm seemed so strong that after discussion with Dr. Monk it was decided that thoracotomy was justifiable. The patient was admitted to the Royal North Shore Hospital on October 13. Examination of sputum taken on that day gave negative results for tubercle bacilli. The blood count was within normal limits. On October 27 the patient was submitted to thoracotomy, and resection of the upper lobe of the left lung was performed. The pathologist reported that chronic caseous tuberculosis was found in the specimen removed. Dr. Bayliss commented that in retrospect, after the evidence had been weighed, it still seemed that thoracotomy was the correct procedure.

Actinomycosis of the Left Lung.

DR. M. P. SUSMAN showed a man, aged sixty-one years, who had sought medical advice one year previously for persistent coryza, cough, copious sputum and loss of weight. He had been given a course of sulphonamide drugs without result. Five weeks before his admission to hospital the sputum had increased in quantity and had an unpleasant taste and odour. In the subsequent five weeks he had five hæmoptyses and another just after his admission to hospital. The last-mentioned was associated with a dull pain in the left subaxillary region. During the five weeks before his admission he had been troubled also by fatigue and listlessness, further loss of weight (he had lost one and a half stone in twelve months) and occasional night sweats.

Examination of the patient revealed no abnormality. Significant negative findings were the absence of finer clubbing, of shift of the mediastinum and of accompaniments of breath sounds on auscultation. The sputum was examined for acid-fast bacilli and neoplastic cells, with negative results in both cases. The Wassermann test also produced a negative result. The combination of clinical features and X-ray evidence suggested that the condition was neoplastic and the patient was submitted to thoracotomy, after which left pneumonectomy was performed because on palpation the lesion felt like a neoplasm. Pathological examination of the specimen showed the lesion to be of a chronic inflammatory nature, and the pathologist supplied the following report: there was a roughly cone-shaped area of pale, consolidated tissue in which there were two abscesses, each about 1·5 centimetres in diameter. Microscopic examination showed that in the consolidated area the lung tissue had very many fat-laden histiocytes lying in the alveoli. The abscesses contained collections of polymorphonuclear cells, within which were some structures which had the appearance and the staining colonies of actinomycoses. The type of inflammation also supported the diagnosis of actinomycosis.

Hydatid Disease.

DR. IAN MONK showed a young man, aged nineteen years, who had enlisted in the Royal Australian Air Force in January, 1955. On his enlistment an X-ray examination of the chest revealed no abnormality (this X-ray film was subsequently reviewed and the findings were confirmed). In August, 1955, he had fractured his left clavicle, and during a radiological examination an abnormality of the lung was noted. Further X-ray studied revealed the presence of three rounded opaque areas in the left lung measuring some five centimetres in diameter. Because of the presence of multiple rounded opaque areas in the lung, and because an X-ray examination of the chest had been known to reveal no abnormality seven months previously, a diagnosis of secondary deposits from an undisclosed primary growth was made. Examination of the patient revealed no abnormality. A blood count gave normal findings. The Casoni test produced a negative response. X-ray examination with a barium meal, excretion pyelography, studies with perirenal insufflation of air and X-ray films of the long bones all revealed no abnormality. The spleen was thought to be enlarged in one X-ray film, and this organ was clinically palpated on one occasion. As a diagnostic measure a course of X-ray therapy lasting for three weeks was given, but no effect was noted on the size of the tumours. When the patient was first examined at the hospital in December, 1955, no abnormal physical signs were elicited except that the edge of the spleen could be palpated. In view of the fact that the opaque areas in the chest were unilateral, the patient was apparently in robust health and one tumour was slightly lobulated, and because it was known that hydatid cysts in the lung could grow rapidly, a diagnosis of hydatid disease was suggested. Further, it was thought essential to establish a definite diagnosis because the patient was so young.

On January 4, 1956, left thoracotomy was performed after preliminary bronchoscopic examination. Three large hydatid cysts were removed, one from the upper lobe and two from the lower lobe. The spaces left in the lung were obliterated, and the chest was closed with drainage. The patient was discharged from hospital on the ninth day after operation. Dr. Monk remarked that the patient might be suffering from generalized hydatidosis, and that further cysts might disclose themselves in the abdomen. Several patients had been examined to whom a diagnostic course of X-ray therapy had been given. Such a practice could rarely be justified now when an exploratory thoracotomy was so safely and easily performed.

Fibrocystic Disease of the Pancreas.

DR. CLAIR ISBISTER showed a boy, aged eight years, who from birth had passed bulky, offensive stools. When he was only a few weeks old he had developed a cough, and from the age of six months he had had frequent attacks of respiratory infection varying in severity. During the past four years he had never been free of a cough. He produced large quantities of mucopurulent sputum, four to five ounces being obtained by postural drainage. His cough was more severe in the morning. He had attended the bronchiectasis clinic and been much helped by physiotherapy and postural drainage. Pancreatin had been administered with no change in his condition, and he had received antibiotics (penicillin) during attacks of fever up to one year prior to the meeting. At that time his condition had begun to deteriorate rapidly, and he had become very breathless and unable to cough up the sputum. Sixteen months prior to his admission to hospital he appeared like a child in *status asthmaticus*. He was cyanosed, in acute respiratory distress and unable to lie down and extremely apprehensive. Any attempt to posture him greatly distressed him. However, he was afebrile, and it seemed that some other factor than infection was the main cause of the deterioration. Investigation of his history elicited the fact that he was then nearly seven years old, and that his brother had died of the same condition a few days after his seventh birthday. The child knew that, his mother was very apprehensive, and as the birthday approached the child's condition deteriorated rapidly. He was admitted to hospital.

On examination of the patient he was found to have pronounced clubbing of the fingers and toes. His chest expansion was poor, his sternum was prominent, and there was an increase in the antero-posterior diameter. Inspiratory recession was present in the intercostal spaces, and the supraclavicular percussion note was dull at the bases of both lungs. The respirations numbered 30 per minute. Râles and inspiratory and expiratory rhonchi were heard in all areas. The liver was palpable two fingers' breadth below the costal margin, and was tender. The abdomen was distended and tender on palpation. The stools were large and offensive and were passed two or three times per day. A cultural examination of the sputum produced a profuse growth of penicillin-resistant *Staphylococcus aureus*, but no tubercle bacilli. The Mantoux test produced a negative response. The test for trypsin in the stool gave negative results. An X-ray examination of the chest revealed increased broncho-vascular markings throughout both lungs, the appearances being consistent with an acute inflammatory lesion.

The child was kept at bed rest for the first few days only, as it depressed and weakened him. Antibiotic therapy was given in the form of "Aureomycin", 125 milligrammes every six hours. He was given one drachm of an ephedrine and phenobarbital elixir three times a day. Pancreatin, double strength, was given in the dosage of 2·5 grammes three times a day, and a quarter of a grain of phenobarbital was given twice a day. Chloral hydrate was given when necessary at night. Postural drainage was carried out after sedation. The child's condition gradually improved, the sputum became more profuse and drained away better, and his appetite improved. Cultural examination of the sputum later produced an "Aureomycin"-resistant staphylococcus, but it was decided to continue with the "Aureomycin" therapy in a dosage of 75 milligrammes every six hours, and he was discharged from hospital. He attended the out-

patient department regularly, and was readmitted to hospital three months later with an acute febrile episode and increased signs in the chest; that responded to "Achromycin" in a dosage of 500 milligrammes per day, and the child was discharged from hospital one week later, taking "Achromycin" in a dosage of 50 milligrammes every six hours. He progressed satisfactorily. The administration of pancreatin was suspended, as it seemed to make no difference. He commenced school for the afternoons only.

He was readmitted to hospital six months later with a severe bilateral frontal headache and vomiting and slight fever and some œdema of the legs. Examination of the optic fundi revealed engorgement of veins, but no nervous signs. An electroencephalogram suggested a lesion in the right temporal lobe. Lumbar puncture produced cerebro-spinal fluid at a pressure of 300 millimetres of water. The fluid contained two lymphocytes per cubic millimetre. The protein content was 12 milligrammes per 100 millilitres and the chloride content 675 milligrammes per 100 millilitres. The sugar content was 75 milligrammes per 100 millilitres. The child was treated as before with 500 milligrammes of "Achromycin" per day. He responded well, and a subsequent electroencephalographic examination revealed subsidence of the signs in the right temporal lobe; but Dr. Eric Davis considered that there were still signs probably due to raised intracranial pressure. It was concluded that he had had cerebritis that had subsided. He was examined by Dr. McNair Scott, who suggested starting treatment with "Digoxin", as there had been signs of raised venous pressure and cardiac failure. Dr. Isbister said that since then the child had attended the pædiatric clinic regularly. "Digoxin" therapy was suspended as he became nauseated by it, and it had been necessary to change from tetracycline to "Chloromycetin". Several cultures of sputum had produced tetracycline-resistant staphylococci, and whenever he was changed back to tetracycline he lost weight and did not feel well. During the few weeks preceding the meeting he had not been so well. He had been more breathless and had tired easily, having headaches and often a mild fever. The dose of "Chloromycetin" had been increased, but it appeared that the antibiotics had only delayed the inevitable. However, he had remained cheerful, and it had been possible to relieve most of his distress and apprehension. Postural drainage removed the profuse, offensive sputum and kept him more comfortable. Encouraging him to do as much as he could had greatly improved his emotional state. It was obvious that each period in hospital had been a great setback, and admission to hospital was being avoided if possible.

Hurler's Syndrome Complicated by Probable Perthes's Disease.

DR. R. H. VINES showed a boy, aged six years, who had been first examined at the request of Dr. Laurence Macdonald when aged three years, because of the onset of pain in the right thigh causing him to limp. His progress to the age of fifteen months had been normal, and by that time he could walk and say a few words; but from then on his intellectual advance had been very slow. His speech and behaviour were now at no more than a three-year-old level. Recently he had suffered an epileptiform seizure. Examination of his facies revealed the depressed nasal bridge, coarse features and large scaphocephalic skull of Hurler's syndrome. On the dorsal aspect of the arms were pale papules, three to five millimetres in length, typical of that disease. His short fingers were greatly "clawed". The corneal infiltration and hepatosplenomegaly often seen in that condition were not present, but he had a supraumbilical hernia and some loss of lumbar lordosis. Typical radiological features present included distortion of the metacarpals and phalanges, a defect of the antero-superior portion of the twelfth dorsal vertebra, and bilateral *coxa valga* with broadening of the femoral necks more pronounced on the right side. By the end of 1953, flattening and fragmentation of the right femoral head epiphysis were also present. Those changes had regressed, sclerotic areas had appeared and similar changes had occurred on the left side as well. No reports of similar changes in the femora in gargoylism had been found, and it was suggested that they might represent the complication of Hurler's syndrome by Perthes's disease.

Cretinism.

DR. NEVILLE PERCY showed a boy, aged four and a half years, who was suffering from treated cretinism. The condition had been diagnosed when the child was aged four months and treated with average doses of dry thyroid since then. He was now clinically well, but on examination was small for his age and slightly retarded mentally, and his bony age lagged some twelve to fourteen months behind his chronological age. Dr. Percy said that the boy was presented with a plea for the earliest possible diagnosis. When transplacentally acquired hormone was exhausted at the age of three to six weeks, even suspicion of cretinism should demand full "base line" investigation with close watch on progress, especially mental and osseous, to ensure adequate treatment as opposed to apparently adequate treatment. Dr. Percy suggested that initially dry thyroid should be given in a dose of not more than one-sixteenth of a grain per day, the dose being doubled every two weeks till the appearance of early toxic symptoms, with a maintenance dose just below that level. In some cases sodium lævo-thyroxine might produce a better response when dry thryoid was not tolerated.

Ulcerated Thrombotic Leg.

DR. C. H. WICKHAM LAWES showed a married woman with three children, who nineteen years previously had sustained deep vein thrombosis in both legs after childbirth. She had been in hospital for several months. In July, 1952, she had complained of recurrent ulceration of both legs, varicose veins, heaviness and a bursting feeling in both legs with severe pain. She was a chronic invalid. In February, 1953, the varicose veins were operated on. The operation resulted in some lessening of the discomfort in her leg, but no improvement in the healing of the ulcers. In July, 1953, section of the right popliteal vein was carried out. This resulted in almost complete disappearance of the pain; the ulcers healed but later broke down. In February, 1954, section of the left popliteal vein was performed. In October, 1954, she had very little pain in the legs. There was a "blow-out" in the right calf and right ankle. In November, 1954, at operation the "blow-outs" in the calf and at the ankle were divided. In January and February, 1956, Bisgaard treatment was carried out on the left leg. All the ulcers healed except a small ulcer in the front of the left leg. The bursting and aching pain was relieved and the swelling diminished.

Dicephalic Monster.

DR. W. S. B. STUDDY showed a dicephalic monster. The mother had been aged twenty-seven years, and the expected date of confinement was February 22, 1956. Her blood was group O, Rh-negative. It was her first pregnancy. She had been admitted to hospital on February 22. The membranes ruptured spontaneously at 9 a.m. on March 13, and meconium-stained liquor was then passed. The cervical os was fully dilated at 9.15 a.m. on that day. Fœtal heart sounds were irregular at 10.30 a.m. Labour began on March 12, and the child was born on March 13. The first stage lasted eight hours forty-eight minutes, the second stage four and three-quarter hours, and the third stage ten minutes. Dr. Studdy said that the patient was first examined in consultation on March 13 at 2 p.m. The head, shoulders and arms of the "first fœtus" had already been delivered, and impaction had then occurred. Episiotomy had already been performed, followed by manual rotation and forceps delivery of the head of the "first fœtus". Under general anæsthesia the monster was then rotated under the *symphysis pubis* by traction on the shoulders with one hand and traction on the buttocks by the other hand in the vagina, as well as fundal pressure by an assistant. Manual removal of the placenta was then performed and the episiotomy incision was sutured. The monster consisted of a single pelvis and trunk with two separate thoraces and heads and four arms. There were two legs and a third rudimentary leg. The external genitals of one male fœtus were normal and those of the other male fœtus were rudimentary.

Congenital Gigantism of the Left Arm due to Lymphangioma.

DR. DAVID DEY showed a boy, aged seven years, who had first been examined in 1955 because of congenital gigantism of the left arm and hand due to a diffuse lymphangioma. The process also involved his penis and scrotum. He had already undergone an operation on his hand elsewhere, which had produced little improvement. In August, 1955, the skin and scars of the previous operation and all the subcutaneous tissue were removed from the dorsum of his hand, the tendons being left covered only by paratenon. The process extended only to the deep fascia. A dermatome graft cut from the left thigh covered the area well and had considerably reduced the bulk of the hand. In February, 1956, the skin of the forearm over about one-half of its extent was removed as a thick split graft with the dermatome. The underlying subcutaneous tissue was excised down to deep fascia, then removed tissue weighing some 240

grammes. The skin was replaced as a graft. Dr. Dey said that the result had been very pleasing. The thickness of the subcutaneous tissue could be well seen at the sides of the grafted area. No disability was evident, and the limb was used much more freely because of its lessened weight. The remainder of the forearm would be treated similarly in some six months' time, after which further operation on the fingers would be necessary to reduce their bulk.

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held on June 1, 1956, at the Anatomy Department, University of Adelaide.

Biology of Fowl Spermatozoa.

DR. G. W. GRIGG discussed the biology of fowl spermatozoa, which he said differed in many respects from sperms of other domestic animals. Apart from their structure, they differed in many chemical and physiological properties. The sperms had a relatively short life *in vitro*, but a long life *in vivo* in the oviduct of the hen. Their movement in the hen was analysed by labelling them with P^{32}. It was found that active movement by the sperms occurred during only two very short periods of their movement from the vagina to the egg. One was in the vagina, the other immediately prior to penetration of the egg. At all other times sperms were transported by either passive or active movement of the oviduct. The presence of a restrictive mechanism at the utero-vaginal junction was demonstrated. The placing of sperm above that block resulted in a remarkable increase in the proportion of sperms reaching the site of fertilization at the top of the oviduct, and a corresponding rise in the fertility of semen having a low fertility when inseminated by the normal intravaginal method. Dr. Grigg said that application of those observations to artificial insemination practice had completely eliminated sterility in hens at the Poultry Research Centre. Mean fertilities of 93% from many thousands of eggs set were now achieved. In conclusion, Dr. Grigg discussed the usefulness of artificial insemination in a complicated breeding programme such as that of the Commonwealth Scientific and Industrial Research Organization Poultry Research Centre, where 130 cockerels were mated to 1000 hens once a week.

Evidence For and Against a Discontinuous Chain Structure for Nucleic Acid.

MR. J. H. COATES discussed the evidence for and against a discontinuous chain structure for nucleic acid. He said that the X-ray diffraction methods of Franklin and Gosling, on which the currently accepted Watson Crick structure of deoxyribose nucleic acid was based, were fundamentally incapable of determining whether the two polynucleotide strands were continuous, or whether there were breaks in the strands. The stability of the native D.N.A. molecule would not be greatly affected by those breaks, as the purine-pyrimidine hydrogen bonds would still hold the shorter polynucleotide chains together. However, from the point of view of possible biological mechanisms, shorter discontinuous chains would probably be able to untwist more easily than continuous ones. Such untwisting might possibly occur in a living cell. Evidence from titration studies, dye binding, effect of heat and enzymic degradation, all relatively indirect methods, seemed to point to breaks in the polynucleotide chains every 25 nucleotides. The problem had been approached by treating calf thymus D.N.A. with hydrogen bond-breaking agents, and the resulting artefact had been examined by means of the ultra-centrifuge and in some experiments U.V. absorption. With acid and alkali the sedimentation diagrams and the S *versus* C curves of the artefact produced under the experimental conditions showed no features that would be readily explained by the interrupted chain hypothesis. It had been suggested that the H bonds of D.N.A. were broken by treatment with sodium ethyline-diamine-tetra-acetate followed by urea. U.V. absorption experiments had shown that that was not the case, and the S *versus* C curve tended to confirm that result. Those results suggested that if the two polynucleotide chains of D.N.A. did separate at any stage in the cell, as far as calf thymus D.N.A. was concerned, the mechanism must probably be one of untwisting the whole molecule.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

SPECIALISM.[1]

[From the *Australian Medical Gazette*, 30 August, 1869.]

IF specialism were to become general an unfortunate individual instead of having a number of well educated general practitioners to apply to, would require a specialist for the affections of each separate organ. Special hospitals have been advocated under the pretext that certain complaints such as diseases of the eye, the ear, the feet, and the sexual organs could be treated more successfully in a special than in a general hospital. There can be no greater fallacy than this in proof of which we may refer to the opinion of one of the soundest and most eminent writers in recent times, the late Sir William Lawrence, who in the introduction to his admirable treatise on the diseases of the eye has left his opinion on record in reference to specialism in the following remarkable language. "Exclusive attention to a small corner of the animal structure, causes a confinement of mental vision analogous to the near-sightedness which mechanics contract by constantly poring over the minute objects of their attention. All the habits of the oculist lead to a separation and insulation of the organ. The part is detached from the system, treated by washes, drops, ointments: and this inefficient trifling impedes the progress of ophthalmic surgery. We want instead of this, general and comprehensive views, the aid of analogy and contrast: the whole field of medicine and surgery must be laid under contribution for the principles which are to guide us in learning the nature and treatment of ophthalmic disease. Professed oculists have done little for the science either here or abroad. The only real and valuable improvements have proceeded from men of extensive anatomical knowledge and of great general insight into disease."

Correspondence.

HYPOTENSION AFTER "THIOMERIN" IN A PATIENT RECEIVING "SERPASIL" AND "ANSOLYSEN".

SIR: With reference to Dr. A. McQueen Thomson's letter, it is a well-known fact that restriction of salt loss from any cause, including mercurial diuretics, may greatly potentiate the hypotensive effects of ganglionic blocking agents such as pentolinium ("Ansolysen"). This point was indeed specifically mentioned in my report on the management of severe hypertensives published in THE MEDICAL JOURNAL OF AUSTRALIA on October 29, 1955. The patients at our clinic treated with ganglionic blocking agents are all warned, in writing, to be prepared for such an event.

Yours, etc.,

G. E. BAUER,
Cardio-Vascular Clinic.

Sydney Hospital,
July 16, 1956.

THE FLUORIDATION OF WATER SUPPLIES.

SIR: May I have space to express my opinion on the addition of soluble fluorides to town water supplies. That the addition of fluoride lowers the incidence of caries I am convinced. That the percentage reduction is as claimed I do not accept. In evidence before the Select Committee of United States Congress in 1952, the chief proponents when under cross-examination cited the statistics for Kingston and Newburgh, the latter after five years' fluoridation showing the following results. Deciduous teeth of five to eight year group 35% lower than Kingston. When the five to six year old group were arbitrarily selected on the basis of all caries-free deciduous cuspids and first and second deciduous molars, the Newburgh group were considered caries free, and reported as 64% better than the Kingston controls. How is the 64% improvement determined?

[1] From the original in the Mitchell Library, Sydney.

Kingston had 30% caries free, Newburgh 49·2%. This means that there were 19·2% more caries-free children in Newburgh, not 64% more. In other words, as the Select Committee states, after five years' fluoridation, 50·8% of children in the selected group had caries compared with 70% in Kingston. The Select Committee underlined these statistics, of which much has been heard throughout the world, and cited the results of an investigation by a Minneapolis caries study group (*J. Am. Dent. A.*, December, 1941), in which eight dentists examined 33 subjects. Each patient was examined by three dentists, who knew their findings would be checked, and who had unlimited time, such as would not be the case in a mass survey of children. A test of significance applied to this data by Mr. O'Halloran of the Antioxidant Research Project indicates that in the case of five examiners to whose results statistics can be applied, agreement would occur once only in 50 to 100 times. I am responsible for a long-range investigation of the effects of continued ingestion of antioxidant additives to foodstuffs. Nothing is known except that in acute animal experiment no effect has been observed. If, however, such substances were to be an integral part of the dietary over a prolonged period, these results are considered to be inadequate in the opinion of international authorities. In the case of fluorides, however, there is definite evidence of cumulative retention in the human body. Even the Select Committee extracted this information from a reluctant United States public health witness.

As I see it, certain United States public health officials prematurely advocated the use of fluoride in water supplies five years before their own planned ten-year experiments were completed. What disturbs me, however, is the lack of both scientific and ethical principles involved in the advocacy of mass medication via the water supply. That it is in fact mass medication was determined by the committee.

It is an established fundamental principle of pharmacological action that there is a range of response to an effective agent by a mixed population of human beings. This range can be accurately determined, and varies from the highly susceptible minority, through the large intermediate group, to the equally highly insusceptible minority at the other extreme. There is no such thing as a "standard" or normal response, any more than there is a minimal lethal dose. The empirical administration of drugs has been based upon the observation of effect in the individual patient by the physician. This is the doctor-patient relation, and is implicit in the medical qualification and legal registration. I submit that medication of a whole populace variable in individual response, regardless of individual age, state of teeth, of general health, rate of consumption of water, and so on, is quite unscientific and unethical, and that passive acceptance of the right of a government or municipal authority to implement such medication through its water supply is to sacrifice a fundamental principle of medical practice. This may well redound to our discomfiture at a later date. Should the facts warrant therapeutic administration of fluoride, let it be done by a physician responsible to the parents of the children treated—the highly attenuated dose poses no technical problem. Once, however, the principle of personal responsibility is abandoned, why not iodine in the water supply in goitrous regions, or aspirin, for the mass Australian headache? Implicit in the reasoning of all proponents is the paramountcy of statistics over the individual. This is of the very essence of authoritarian "progress"—or am I wrong? If I am, I find myself in company with all the members of the Congressional Select Committee which cross-examined the chief proponents, and with the Royal Medical Board of Sweden, a not unenlightened country.

Yours, etc.,

C. STANTON HICKS.

Department of Human Physiology and Pharmacology,
University of Adelaide,
Adelaide.

July 11, 1956.

ALCOHOLISM—A COMMUNITY RESPONSIBILITY.

SIR: I am afraid that Mrs. Heaslip has read too much into my letter. I do not query the value of the work done by institutions in the case of alcoholics, nor do I belittle in any way the great value of the work done by Dr. W. J. Salter in their care and treatment. The point I wish to raise was that alcoholism is a medical, and not a psychiatric, disease.

Until the advent of Alcoholics Anonymous twenty-two years ago, alcoholics were regarded as moral lepers to be talked down to by doctors, psychiatrists and clergymen. The medical problems met with during an attack of acute alcoholism were ignored, as they still are by even the most modern psychiatric text-books. Because they could get no help from doctors and clergymen, alcoholics were compelled to analyse their own problems themselves. They knew that by following a philosophy of life they could live without the nervous tension that precipitates a bout, but the basic problem of why they cannot drink like normal people remains unanswered.

Psychiatrists still see the explanation of alcoholism in psycho-analytical theories, and pin their faith to recognized psychiatric treatments, which, because they do not touch the basic mental and physical problems involved, inevitably fail.

Even the success of Alcoholics Anonymous is explained in psychiatric terms, such as group therapy, or even more uncharitably as exhibitionism, or emotional evangelism. But the basic faith and spirituality of the Alcoholics Anonymous programme is not acceptable to most psychiatrists. As Dr. Ian Martin wrote in the *Australasian Psychiatric Newsletter* (Volume V, Numbers 14 and 15, January-March, 1953, page 4) in answer to an unpublished article in which I pointed out the necessity for faith: "Whilst faith is important, it must be leavened with judgement, and must not be allowed to blind the intellect in our search for scientific truth, if we are to achieve emotional and intellectual maturity. Whilst we should be aware of our shortcomings, we need not feel inferior to our colleagues in other fields, who are also limited. 'We should not forget the blind faith of the Nazi, the Fascist and the dead end kids, nor the blind faith that feeds the predatory quack, and the faith-healer.'"

This letter, which is presumably the official view of Australian psychiatrists, shows how wide is the gap between alcoholics and psychiatrists. To the psychiatrist, emotional and intellectual maturity is something intangible, depending on the individual views of psychiatrists themselves. There can be no fixed standards. To them the intellect is supreme. They but resurrect the thinking of the ancient Greeks, a thinking which led to irretrievable national disaster.

On the other hand, to members of Alcoholics Anonymous, who are usually very intelligent, hard, bitter, experienced men and women of the world, intellectual and emotional maturity means not only keeping their feet planted firmly on the ground, but having absolute faith and trust in a Power greater than themselves. To the great majority of them this means faith in God as they understand Him. By doing this they free themselves from the shackles imposed by the limitations and narrowness of their own intellects, and become free to walk with the Infinite. They then find a peace and security of mind "that surpasseth all human understanding". For as long as they continue to do this, they remain serene and happy, and free of nervous tension.

Because so many of the medical and psychological problems of their cases remain unsolved, alcoholics are most anxious to cooperate with doctors and psychiatrists. All that they ask is that their philosophy of life will be studied with an open mind, sincerely and honestly. In return, psychiatrists will be amazed to learn that the "Twelve Steps" of the Alcoholics Anonymous programme opens up an entirely new approach to psychiatry, and solves many problems that baffle psychiatrists today.

Yours, etc.,

195 Macquarie Street,
Sydney,
July 11, 1956.

S. J. MINOGUE.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 37, of July 5, 1956.

AUSTRALIAN MILITARY FORCES.

Citizen Military Forces.

Southern Command.

Royal Australian Army Medical Corps (Medical).—To be Major, 16th May, 1956: 3/123264 Captain B. Clerehan.

3/101835 Captain (provisionally) J. B. Drake relinquishes the provisional rank of Captain and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Southern Command) in the honorary rank of Captain, 7th March, 1956.

Western Command.

Royal Australian Army Medical Corps (Medical).—5/26429 Major K. W. H. Harris is appointed to command 7th/13th Field Ambulance and to be Lieutenant-Colonel, 1st July, 1956.

5/26393 Lieutenant-Colonel L. P. Gray relinquishes command 7th/13th Field Ambulance, 30th June, 1956, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Western Command), 1st July, 1956.

Reserve Citizen Military Forces.

Royal Australian Army Medical Corps.

Northern Command.—To be Honorary Captains: Brian Leslie Hillcoat, 18th May, 1956, Harold Reginald Magee and Mary Neville Armbruster, 21st May, 1956, and Barry Nurcombe, 28th May, 1956.

Southern Command.—To be Honorary Captain, 25th April, 1955: Samuel Chazan.

ROYAL AUSTRALIAN AIR FORCE.

Permanent Air Force: Medical Branch.

The probationary appointment of the following Flight Lieutenants is confirmed: J. F. A. Gaudry (0216890), A. Cameron (039928), W. Blake (014736).

The following officers are appointed to a permanent commission: Squadron Leader A. D. Litchfield (024304), 20th October, 1955; Flight Lieutenant (Acting Squadron Leader) W. E. Downey (036102), 18th June, 1956.

The short-service commission of Flight Lieutenant D. M. Newman (013992) is extended to 1st June, 1959.

The resignation of Flight Lieutenant R. W. L. Hall (024941) is accepted, 9th March, 1956.

The following are appointed to a short-service commission, on probation for a period of twelve months, with the rank of Flight Lieutenant: John Neilson Burry (0310758), 30th April, 1956; Keith Merven Sowden (015775), 17th May, 1956.

Michael John Seyfort (0312862) is appointed to a short-service commission, on probation, 15th March, 1956, with the rank of Pilot Officer (Student).

Flying Officer L. T. C. West (041923) is appointed to a permanent commission, 3rd April, 1956.

The short-service commission of Flight Lieutenant (Acting Squadron Leader) G. S. Radford (025626) is extended to 30th August, 1956.

Flight Lieutenant A. Cameron (039928) is granted the acting rank of Squadron Leader, 1st March, 1956.

Flying Officer L. T. C. West (041923) is granted the acting rank of Flight Lieutenant, 1st January, 1956.

The resignation of Flight Lieutenant J. G. Campbell (039449) is accepted, 9th May, 1956.

Active Citizen Air Force: Medical Branch.

No. 21 (City of Melbourne) Squadron.—Flight Lieutenant J. L. Colvin (015162) is transferred from the Reserve, 4th February, 1956.

No. 23 (City of Brisbane) Squadron.—Flight Lieutenant S. W. Page (015293) is transferred to the Reserve, 26th April, 1956.

Air Force Reserve: Medical Branch.

The following former officers are appointed to a commission with the rank of Flight Lieutenant: D. A. Dowie (649), 18th October, 1955; L. N. Walsh (039386), 15th December, 1955; W. H. Koschade (0311673), 24th December, 1955; P. L. T. Ilbery (422957), 30th January, 1956.

The following are appointed to a commission with the rank of Flight Lieutenant: Harold Keith McComb (295557), 14th December, 1955; Kevin Leahy King (277639), 22nd December, 1955; Ronald Atkinson Hurley (257946), 13th February, 1956.

Air Cadet James Patrick McCarthy (0311615) is appointed to a commission, provisionally, 3rd February, 1956, with the rank of Pilot Officer.

The provisional appointment of the following Pilot Officers is confirmed and they are promoted to the rank of Flight Lieutenant: E. E. Allchin (034708), 19th December, 1953; M. M. Harvey (015223), L. G. Lukin (015224), S. R. Duke (015222), W. A. J. Campbell (015220), 8th December, 1955; P. F. Claremont (024267), F. G. Harrison (024092), G. R. Gibson (0211526), J. M. Purchas (0211552), D. J. Penney (0211530), 24th January, 1956.

The following officers are promoted to the temporary rank indicated: (Group Captain) Flight Lieutenant (Temporary Wing Commander) B. N. O. Colahan (3225), 1st March, 1956; (Wing Commander) Squadron Leader A. M. Beech (033454), 20th March, 1956; (Squadron Leader) Flight Lieutenant C. F. McCann (257631), 1st March, 1956.

The appointment of the following officers is terminated: Flight Lieutenant (Temporary Squadron Leader) E. F. Northcroft (266734); Flight Lieutenants R. E. Buckingham (267680), 17th February, 1956, and R. J. McArthur (023646), 12th March, 1956.

Medical Practice.

DIAGNOSTIC CRITERIA FOR POLIOMYELITIS.

AT the request of the National Health and Medical Research Council, a statement of diagnostic criteria for poliomyelitis has been drawn up by the Victorian panel of metropolitan diagnostic consultants. The statement, which is published at the request of Dr. A. J. Metcalfe, Director-General of Health, Commonwealth Department of Health, is as follows.

Diagnostic Criteria for Poliomyelitis.

The diagnosis of poliomyelitis in persons vaccinated against poliomyelitis assumes considerable importance in assessing the degree of protection afforded by the vaccine. Once immunization commences the public mind will be as in a poliomyelitis epidemic, and such is the fear of the disease, that any illness is likely to be considered to be poliomyelitis until someone in authority says it is not.

It is hoped that the following list of diagnostic criteria will not only help practitioners in what is often a difficult diagnosis, but may prevent unwarranted criticism of the vaccine by incorrect notification of poliomyelitis in vaccinated persons; or, more important, incorrect provisional diagnosis.

These diagnostic criteria may be divided into three categories:

1. Symptoms and signs usually present in poliomyelitis.
2. Symptoms and signs present in other acute infections, but rarely seen in poliomyelitis—the so-called "negative indicators".
3. The symptoms and signs of the paralyses which may occur in poliomyelitis.

Category 1.—Symptoms and signs usually present in poliomyelitis: fever, vomiting, headache, pain in the back of neck and back, stiffness of the neck—forward flexion only, stiff back, muscular pains in the limbs—rarely severe in the preparalytic stage, drowsiness with lucidity, increased cell count in the cerebro-spinal fluid.

Category 2.—Symptoms and signs present in other conditions but rarely seen in poliomyelitis. These so-called "negative indicators" are: convulsions, coma, cough, complaint of pain in the side of the neck as opposed to pain in the back of the neck, excessively high temperature, 105° to 106° F., except occasionally in the rare encephalitic form, complete absence of pyrexia throughout illness, diarrhœa, a rash, marked pharyngitis or tonsillitis.

Category 3.—Symptoms and signs of the paralyses which may occur in poliomyelitis: Paralysis, when it occurs, is of lower motor neuron type with flaccidity and diminished or absent reflexes. When present in association with other typical signs of poliomyelitis it is practically diagnostic. Care is necessary to distinguish true paralysis from an apparently weak limb due to pain from other causes such as trauma, lymph gland enlargement, scurvy or rheumatic conditions.

The bulbar type of paralysis: The commonest signs of bulbar paralysis are a nasal tone to the voice, regurgitation of fluid through the nose, difficulty in swallowing and pooling of mucus in the pharynx. Facial paralysis, usually unilateral, may be present as the only sign.

Laboratory methods in the diagnosis of poliomyelitis: It should be emphasized that in many patients, particularly the non-paralytic type, it is not possible to make a precise diagnosis of poliomyelitis without laboratory confirmation. Even in the presence of a lower motor neuron paralysis, examination of the cerebro-spinal fluid may reveal that the condition is due to acute infective polyneuritis, in which condition as a rule there is no increase in cells.

The following laboratory methods should be adopted in all cases where any doubt exists: (*a*) examination of the cerebro-spinal fluid, (*b*) isolation of poliomyelitis virus, (*c*) positive serological tests—a raised antibody titre to poliomyelitis virus as shown by serial bleeds, (*d*) serological antibody tests to exclude mumps, *herpes simplex* and other causes of meningo-encephalitis.

The cerebro-spinal fluid in poliomyelitis: The cerebro-spinal fluid in poliomyelitis usually shows an increased cell count (five cells per cubic millimetre being accepted as normal), with a slight increase of protein. The cells are usually predominantly polymorphonuclear in the early stages, changing to a higher proportion of lymphocytes as the disease is subsiding. It has been reported by some authorities that cases of poliomyelitis may have a normal cerebro-spinal fluid throughout the illness. For all practical purposes this may be regarded as exceptional. Examination of the cerebro-spinal fluid is of importance in excluding cases of purulent meningitis and acute polyneuritis.

NATIONAL HEALTH ACT.

THE following notice appeared in the *Commonwealth of Australia Gazette*, Number 37, of July 5, 1956.

NATIONAL HEALTH ACT, 1953-1955.

Notice Under Section 133.

Termination of Doctor's Pensioner Medical Service Agreement.

I, Donald Alastair Cameron, the Minister of State for Health, hereby give notice, in pursuance of sub-section (1) of section 134A of the *National Health Act*, 1953-1955, that I have this day terminated the operation of the pensioner medical service agreement with Noel Louis Fox, of Broken Bay-road, Ettalong, in the State of New South Wales, medical practitioner, under section thirty-three of that Act.

Dated this 21st day of June, 1956.

DONALD A. CAMERON,
Minister of State for Health.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE following medical practitioners have submitted evidence of having completed twelve months' hospital service, pursuant to the provisions of Section 17 (3) of the *Medical Practitioners Act*, 1938-1955, of New South Wales: Anet, Denise Berthe Germaine; Annetts, David Lyle; Baldwin, Douglas Bernard; Barnett, Clive; Bell, David Samuel; Beveridge, Bruce Robert; Biggs, James Crawford; Blower, Charles Russell; Bodlander, Fedor Max Serge; Boon, Peter Eric; Bradfield, Alan Harold; Bradley, Malcolm George; Brenner, Leonard; Breslin, Francis Hugh Dominic; Brookes, Ronald Alfred; Cable, Ronald Hughes; Campbell, Eric Charles; Carroll, Peter John; Channon, Pamela; Chapman, David Bruce; Chapman, George Keith; Chia, William; Clarkson, Joan Violet; Cleary, Edward George; Clifford, Arnold; Cole, David Ian; Collins, Frederick John; Connock, Richard Hugh Shephard; Cooper, Bryan Paul; Coulthurst, Keith Dudley; Cross, Janet Buchan; Cruikshank, Nellie Marion; Davey, Ronald Bruce; Davis, Douglas Barry; Don, Ronald Alexander; Edwards, Lawrence Alfred; Ehrlich, Frederick; Ellem, Kay Adrian Oswald; Elliott, Francis Maxwell; Elliott, Graeme Robert; Elmslie, Ronald Gordon; Elphick, Richard Lansdell; Ferguson, Peter Langbene; Fisher, Frank; Fisher, John Watt; Fitzgerald, Delicia Diana; Fletcher, Allen Lucas; Gallagher, Vera; Gallagher, William Terence; Gillies, Malcolm John; Glen, Donald Lochinvar; Glenn, David Campbell; Gye, Richard Spencer; Hansen, Peter John; Hart, Robert Mercer; Harvey, Francis John; Harvey, Patrick Watson; Hasemer, Judith

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED JULY 7, 1956.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	..	2(2)	2(1)	..	..	..	..	..	4
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	..	..	..
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	1(1)	..	..	..	..	..	..	1
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	..	6(6)	2(1)	..	..	..	..	..	8
Diphtheria	3(3)	..	1(1)	..	2	..	..	..	6
Dysentery (Bacillary)	..	..	1(1)	..	..	..	..	..	1
Encephalitis	..	2(1)	..	..	..	..	..	..	2
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	1(1)	..	..	..	1	..	..	2
Infective Hepatitis	67(42)	52(21)	..	16(8)	5(3)	7	3	4	154
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	5	..	..	..	..	..	5
Malaria	..	2(2)	1	..	..	..	..	..	3
Meningococcal Infection	1	2(1)	2	..	..	..	..	..	5
Ophthalmia	..	..	..	..	..	..	2	..	2
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	1	8(7)	..	1(1)	1(1)	3(1)	..	..	14
Puerperal Fever	..	..	..	..	..	..	1	..	1
Rubella	..	8(8)	1	..	..	..	..	..	9
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	11(5)	14(11)	3	3(2)	1(1)	..	..	..	32
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	2	..	..	..	..	..	2
Trachoma	..	1(1)	..	..	1	..	..	..	2
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	17(13)	15(11)	7(4)	2(1)	9(7)	4(1)	..	..	54
Typhoid Fever	..	..	1(1)	..	..	..	..	..	1
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Winifred; Holcombe, Maureen Ena; Hudson, David Lindsay; Hughes, Leslie Ernest; Hughes, Peter Dalton; Hunt, John Francis; Ingle, Charles Bruce, Jefferis, John Elbury; Jeremy, David; Johnson, Frank Louis; Kemp, John Francis; Klein, Douglas George; Korten, Susanne; Lang, Francis Houstoun; Learoyd, Brian Meldrum; Leckie, Thomson David; Leigh, Boyd Lionel Hilton; Levi, Louis; Lewis, John Blake Paviour; Lloyd, Alan Murray; Lorang, John Erik; McArthur, Richard James; McEwen, Brian William; Manners, David; Mar, Albert Vincent; Maxwell, Donald Charles; Mitchell, Lindsay; Morgan, Graeme John; Morgan, John; Munro, Lyle; Muscio, Peter Allan; Muston, Jacqueline April; Newman, Rohma; Ng, Hein Wah Francis; Ng, Thomas Khoon-Fong; Nossal, Gustav Joseph Victor John; Oakley, June Rosiland Lytton; O'Sullivan, Eugene Peter; Pacey, Spencer Milverton; Parer, Brian Michael; Paul, Leslie; Pearce, John Warran Boswell; Peters, Harry; Phillips, Richard Arthur Carlisle; Poate, William James; Porter, John Alfred; Preswick, George; Quigley, Donald James; Rowe, Sydney Gale; Ryan, William Phillip: Scougall, James Selwyn; Sgouramallis, John; Shanahan, Mark Xavier; Shand, John Wentworth; Shenstone, David Beverley; Smith, Donald Wood; Solomon, Herbert John; Sporr, Walter Fritz; Stein, Brian William; Stevenson, George Telford: Taylor, Thomas Kinman Fardon; Symons, Michael Frank; Tents, Reni Wiiu; Thomas, Edna Rae; Tooth, Richard Murray; Wake, Peter John; Wald, Marx; Walker, Alan Courtenay; Walker, Geoffrey Shepherd; Walker, Lindsay Ronald; Watson, John Glenton; Wee, William Soon Cheng; Whitehouse, Cornelia Anne; Wiles, Angus Neil; Woods, William Edward; Woolard, Thomas John; Wright, James Edwin; Yee, Lawrence Radford; Yeoh, Kean Seng; Yeomans, Neville Thomas; Cave, Mary Neila.

TASMANIA.

IN accordance with the provisions of Section 15 (8) of the *Medical Act*, 1955, the right to practise has been conferred by special licence issued by the Medical Council of Tasmania to the following persons. The right to practise is limited to the place respectively stated after each name: Endelmanis, A. A., Municipality of Hamilton; Jerums, J. F., Municipality of Kingborough; Matysek, C., Municipalities of Penguin and Ulverstone; Shuley, K. D., Municipalities of Queenstown, Gormanston and Strahan; Svoboda, D., Municipality of King Island; Wirtz, J. W., Municipalities of Queenstown, Gormanston and Strahan.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Rose, Michael John Asher, M.B., B.S., 1955 (Univ. Sydney), Molesworth Street, Hillston, New South Wales.

Wansey, Richard Barry, M.B., B.S., 1954 (Univ. Sydney), 90 Keppel Street, Bathurst, New South Wales.

Szeps, David, regional registration for Ungarie Region, New South Wales, July 5, 1956, under Section 21 (*a*) of the *Medical Practitioners Act*, 1938-1955, Ungarie, New South Wales.

Cram, Morris, M.B., Ch.B., 1949 (Univ. Edinburgh), 21A Main Street, West Lithgow, New South Wales.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association: Cunningham, Dorothy Elizabeth, M.B., B.S., 1956 (Univ. Sydney); Dawson, Judith, M.B., B.S., 1956 (Univ. Sydney); Farlow, John Lyle, M.B., B.S., 1956 (Univ. Sydney); Jones, Alan Albert, M.B., B.S., 1956 (Univ. Sydney); Palmai, George, M.B., B.S., 1956 (Univ. Sydney); Wells, William Edwin, M.B., B.S., 1956 (Univ. Sydney); Clifford, Arnold, M.B., B.S., 1955 (Univ. Sydney); Martin, Kevin Dominic Francis, M.B., B.S., 1954 (Univ. London), M.R.C.S. (England), L.R.C.P. (London), 1955; Brennan, Sean Desmond, L.R.C.P., L.R.C.S. (Dublin), 1949; Eggins, Barrie James, M.B., B.S., 1950 (Univ. Sydney); Havas, Laszlo, registered in accordance with the provisions of Section 17 (1) (*c*) of the *Medical Practitioners Act*, 1938-1955.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Cooke, Theodore John Lloyd, M.B., B.S., 1956 (Univ. Adelaide), 82 Anzac Highway, Helmsdale, South Australia.

Forbes, David Stewart, M.B., B.S., 1955 (Univ. Adelaide), 10 Avenel Gardens Road, Medindie, South Australia.

Robertson, Anthony Oliver, M.B., B.S., 1956 (Univ. Adelaide), 214 Melbourne Street, North Adelaide, South Australia.

Cox, John Samuel Tweedale, M.B., B.S., 1955 (Univ. Adelaide), 29 Parade, Norwood, South Australia.

Appleby, Robert William, M.B., B.S., 1956 (Univ. Adelaide), Murtoa Road, Eden Hills, South Australia.

McLeay, Colin James, M.B., B.S., 1956 (Univ. Adelaide), 143 Kensington Road, Kensington, South Australia.

The undermentioned has been elected as a member of the South Australian Branch of the British Medical Association: McAuliffe, Rodney Francis, M.B., B.S., 1956 (Univ. Adelaide).

Deaths.

THE following death has been announced:

LUSCOMBE.—Cecil Walter Luscombe, on July 19, 1956, at Robertson, New South Wales.

Diary for the Month.

AUG. 1.—Western Australian Branch, B.M.A.: Branch Council.
AUG. 1.—Victorian Branch, B.M.A.: Clinical Meeting.
AUG. 3.—Queensland Branch, B.M.A.: General Meeting.
AUG. 7.—New South Wales Branch, B.H.A.: Organization and Science Committee.
AUG. 10.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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